

# RAILROAD GAZETTE

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## EDITORIAL ANNOUNCEMENTS.

**THE BRITISH AND EASTERN CONTINENTS** edition of the Railroad Gazette is published each Friday at Queen Anne's Chambers, Westminster, London. It consists of most of the reading pages of the Railroad Gazette, together with additional British and foreign matter, and is issued under the name Railway Gazette.

**CONTRIBUTIONS.**—Subscribers and others will materially assist in making our news accurate and complete if they will send early information

of events which take place under their observation. Discussions of subjects pertaining to all departments of railroad business by men practically acquainted with them are especially desired.

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FRIDAY, OCTOBER 12, 1906.

The Pennsylvania seems to be a pace-maker for the railroads who are not only reducing fares, but also consulting public convenience. It is now announced that on the first of next month a \$20 good-for-bearer mileage book will be put on sale throughout the lines west of Pittsburgh (except the Vandalia), thus making the rate of two cents a mile universal on the 8,000 miles directly operated, east and west of Pittsburgh, for all passengers who can buy \$20 worth of transportation at a time—or who can borrow the book of a friend. For some years there have been conservative railroad men who have believed that a general two-cent passenger rate east of Chicago would not be a calamity—or even an occasion for pronounced regret—and this action of the Pennsylvania at least half confirms that belief. And probably the prophets are not far wrong in looking for the reduction of all rates in central territory to two cents. Such a reduction is not necessarily near, for a mileage-book rate of two cents (net) and a single ticket rate a good deal higher have been in effect side by side in several regions for years. But the legislatures and the newspapers will now gird their loins for a fresh endeavor, and will agitate night and day for the two cent rate for single trips. The Pennsylvania's twenty-dollar book will probably force a similar book from its competitors in that thickly junctioned territory, and the people will expect to carry their point by storm. If general business keeps up its present activity, it is quite likely that the railroads will be in a position to make reductions in something—if they don't have to spend too many millions on separation of grades and on new stations—and passenger rates are the easiest to deal with. The question is simple and the people can comprehend it. Freight rates, on the other hand, are hard to deal with. Their interdependence makes changes much more difficult even when the reasonableness of making a cut has been agreed on. One report has it that the Pennsylvania Lines have already decided to reduce single trip fares to the basis of 2½ cents throughout their lines outside of Ohio, where they have already been reduced to two cents, and to make interstate rates to and from Ohio points on the basis of the sum of the locals in the different states.

The announcement elsewhere in this issue that the Chicago & North-Western is to build a new passenger station in Chicago and entirely separate its passenger from its freight terminals means the beginning of a much-needed change in the badly tangled tracks and stations which has long been endured and which the 22 railroads centering there have only aggravated by piecemeal improvements having little relation to the problem as a whole. Early in 1905 Mr. Frederic A. Delano pointed out in these columns the neces-

sity of concerted and harmonious action on the part of all the railroads looking toward a better grouping of the passenger terminal facilities and presented a feasible, if somewhat radical plan, of his own. Millions of dollars are spent each year in carrying passengers, baggage, mail and express to and from the six widely separated stations which are used by the different roads, to count nothing of the delays and inconvenience incurred. The difficulties to be met in such a plan as Mr. Delano proposed are, of course, enormous. His was an ideal plan and the next best thing is an approach to the ideal in the taking of such definite steps toward substantial improvement as the North-Western is to do. The present terminal of that road is inadequate and inaccessible. The new station will overcome these difficulties to a great extent. There are rumors—which cannot now be confirmed—that the Pennsylvania Lines West are to build a new station to cost as much as the North-Western's, and which will face that station on the east side of Clinton street. If true, this would be another needed improvement along the right lines which might induce the other roads to continue the good work already begun.

For a year or more the easiest way to arouse the excitability of the stock market has been to refer to the likelihood of early announcement of the closing of what has come to be known as the Hill ore deal. Time and again this expected transaction between the Great Northern Railway on the one hand and the United States Steel Corporation on the other was trotted out to bolster up or explain an upward market movement. The facts of the case were that there were in the direct or indirect possession of the Great Northern and, to a much smaller extent, of the Northern Pacific, partly as the result of purchase, more particularly as acquired through land grants to underlying companies, large holdings of mineral territory in the Lake Superior region, estimated to contain between 500,000,000 and 700,000,000 tons of valuable iron ore. With the record figures being made by the iron and steel industry, the ore holdings of the United States Steel Corporation, although estimated to include something like 1,250,000,000 tons, were being consumed at a faster and faster rate. Thus the larger grew the prosperity of the steel industry, the greater became the incentive to the dominating corporation to further extend its holdings of mineral land. On Saturday of last week the long expected announcement of the closing of the deal was made in an official statement by the Steel Corporation to the effect that after long negotiations a contract had been signed for acquisition on a royalty basis of the Hill ore properties, the price to be paid being \$1.65 a ton for ore delivered

at the upper lake docks, with an increase of 3.4 cents per ton in the price each succeeding year. The minimum amount to be mined is 750,000 tons in 1907 and in succeeding years is to increase at the rate of 750,000 tons a year until (in 1917) it reaches 8,250,000 tons, which thereafter will be the minimum agreed production. The initial price of \$1.65 a ton delivered at the docks is made up of two parts: the royalty paid per ton at the mines and the transportation charges for transporting the ore from the mines to lake ports. Eighty cents of the amount is the present transportation charge, leaving 85 cents per ton as the cost of the ore at the mines. This figure of cost at the mines is a standard price for ore containing 59 per cent. of iron. It is to be subject to change according as the percentage of iron in the ore runs above or below this figure. Basing the calculation on this standard price of 85 cents a ton at the mines, the Great Northern will receive in 1907, \$1,237,500 for the minimum of 750,000 tons of ore to be mined. In 1917 and in each succeeding year its receipts from this source will be \$16,417,500 for the minimum production of 8,250,000 tons of ore. These payments are at the rate of about 0.8 of one per cent. on Great Northern stock in 1907, while in 1917 the proceeds will be nearly 11 per cent. on the now outstanding stock. It must be remembered, however, that one element of the price to be paid is a gross receipt from transportation, and there must be deducted from it the cost of carrying. There should be, however, a large margin of profit on the strictly transportation part of the transaction, as traffic in specified amounts is assured and ore is a commodity which in large quantities can be most economically handled. The price paid at the mines is all profit, as the Steel Corporation will assume the expenses of mining the ore. Following the announcement of the lease, the statement was made by Mr. J. J. Hill that he personally was interested only as a stockholder of the Great Northern. In other words, the profits of the sale of the ore accrue to the benefit of the shareholders of that road. The Steel Corporation is now using ore at the rate of from 20,000,000 to 23,000,000 tons a year. Its annual consumption has increased at the rate of from 2,000,000 to 3,000,000 tons for the past five years. Before the acquisition of the Hill ore properties it already controlled ore enough to last about 60 years. The ore contained in the new acquisition should last another 25 years. With the closing of the contract with the Hill interests, the United States Steel Corporation is put even more and increasingly in control of the country's iron and steel trade. The advantages of the lease to the railroad company are obvious. It not only receives a substantial net profit on every ton of ore mined but is assured at the same time of a large, increasing and profitable traffic.

A simple method of railroad acquisition by the state has been proposed in the Argentine Republic. It is announced that a bill will shortly be introduced providing for establishment of an additional duty on all gross receipts of railroads at present existing or which may be built in that country. The annual sum obtained by the government from this tax is to be devoted exclusively to the purchase of railroad stock, and the sponsor of the scheme calculates that within 60 years enough will be produced in this way to enable the entire stock of the Argentine railroads to be purchased by the state. There are several weak points in this scheme of which the enthusiasm of the promoter has probably caused him to lose sight. One is the great improbability of a government, particularly a South American government, agreeing to allow such a hoard of money to slowly accumulate without drawing on it for some purpose for which it was not originally intended. It is also probable that if it were seriously determined to buy up the railroads, the resulting increase in the value of stock would cause the purchase to be somewhat more costly than was provided for in the original estimates. The coolness of the proposal to make the railroad companies pay for their own extinction is sufficient to make some of our own enthusiasts for government ownership sit up and take notice.

It is only a small minority of the news items which appear in the daily papers that have so much meaning in the first three inches as may be found in the following paragraph, divided by us into six paragraphs, published not long ago:

1. The Washington State Railroad Commission is endeavoring to ascertain the cost of construction and present value of all the railroads in that state.
2. This step is regarded as necessary to equip the commission for dealing with the question of railroad freight rates.
3. The commission welcomes criticism or suggestions from engineers or others competent to speak upon the subject.
4. A corps of engineers has been employed to co-operate with the officials

of the Great Northern and Northern Pacific railroads in obtaining data from records by which the work of appraisal may be accomplished more economically than in such states as Wisconsin and Michigan.

5. This appraisal is made in obedience to the new railroad law of 1903.

6. Texas, Michigan, Wisconsin, Minnesota and Washington are the five states which have thus far systematically undertaken to obtain the value of railroad property as a basis of rate regulation.

And the statements are frank and honest, as well as full of meaning. In paragraph 1 the significant word is "endeavoring." That recognition of the possible—it ought to read "probable" or "certain"—failure to accomplish the object aimed at is creditable. Cost of construction is of almost no value when found. "Present value" inevitably recalls the fable of the mountain and the mouse, and even the mouse may be useless next year. Paragraph 2 says that this step is "regarded," etc. This frank writer apparently realized that in actual fact the proposed quest for information is *not* absolutely necessary to an intelligent view of freight rates. Paragraph 3 should call out a dozen forcible and lucid protests from clear-headed publicists in the state; but will it? Would the protests receive as ungracious a welcome as such statements do from state tax boards? Paragraph 4 is decidedly encouraging. Let us hope that the spirit of economy will really prevail, and result in a report of ten pages or less. In paragraph 5 the Commissioners wash their hands of personal responsibility for this use of public money; and paragraph 6 indicates that they are glad to have company in their comprehensive task.

#### WHERE ELECTRIFICATION IS UNPROFITABLE BUT NECESSARY.

It now seems to be decided that the Pennsylvania will use in its electrified New York terminal division a system quite like that of the New York Central; that is, a third rail carrying a direct current, with electric locomotives for express trains and motor cars for suburban service. At this same time the New York, New Haven & Hartford is electrifying a portion of its main line using the overhead contact alternating current system, and locomotives equipped with overhead apparatus for use on its own line, and shoes to take the current from the third rail on the New York Central tracks over which it reaches Grand Central Station. The Westinghouse Electric Company has already built ten locomotives and will undoubtedly be able to supply the New Haven road with the full number required by the time that railroad is ready to use them, but we hear nothing definite of the motor car equipment. If this is delayed it will be unfortunate for the New Haven company and its suburban customers and will double-tax the facilities of the new terminal.

It would seem, therefore, that the two systems concerning whose economy of construction, operation, reliability and safety we have long been theorizing will soon have the test of service and some conclusions made possible. But it is safe to predict that these conclusions will not be conclusive as to the whole subject. In great terminals the electric locomotive has an advantage over the steam locomotive only because it gets rid of smoke; it requires the same number of wasteful operations. Mr. Aspinall, General Manager of the Lancashire & Yorkshire (England), details them as follows:

"Every time a locomotive train comes in and goes out, you have four platform operations and eight signal operations: First of all, the train comes in; then a locomotive follows it, that is two; then the train goes out, that is three; then the locomotive which brought it in goes out, that is four platform operations, which means eight signal operations. The electric motor train comes in, that is one; the motorman goes to the other end of the train and the train goes out, that is two. You have only two platform operations and four signal operations. The result is that you double your terminal accommodation" (by using electric motor trains instead of electric locomotives).

There is another view of the subject: It may be said generally that there is as yet nothing to indicate progress toward electrification for main line work. The outcome of the experiments of the past year or so does not justify the prophecies of some electricians and many laymen. In local, suburban, service the gross income is increased, due probably entirely to the possibility of dividing the traffic of long trains in more frequent short trains; but public opinion controls railroad operations and the public expects and gets low fares on electric trains, although, as a general proposition, steam locomotive traction is less costly. Mr. Aspinall, above quoted, says of his electrified Liverpool & Southport line: "We did not enter into electric traction with any idea that we should get economy of working. We did not expect to save money; we expected to make money—two very different things."

So far as we have evidence, no electrification of a profitable steam road has been made, or is making, with the result or ex-



pectation of direct profit. It is not necessary to qualify this statement by excepting the elevated structures in New York and Chicago, which are properly classified as street railroads. The Long Island company has electrified 120 miles of its line and is operating it at a loss, taking account of the interest on cost. The electrification of the longer of the two Pennsylvania's lines between Camden and Atlantic City was not undertaken for direct profit, but to forestall the building of an independent electric line between these points. Such an independent line was not only projected; its capital cost was already provided; it would have been built and probably operated at a loss, with an ensuing receivership and the usual costly disturbance of the traffic of the paralleled solvent road.

The reasons for electrifying the New York Central terminal are well known. On Manhattan Island it became compulsory, and that much electrification would have increased both the capital cost and the operating cost with no increase in income. The extension of the "Electric Zone" to White Plains on the Harlem line, and Croton on the main line, was solely for the purpose of getting some increased revenue to help offset the heavy cost that was forced upon the company. Similarly, when the Pennsylvania decided that it was necessary to have a station on Manhattan Island, and an all-rail connection with the Long Island and the New Haven roads, there was no question as to the motive power—none other than electricity would be permitted by the City of New York.

Work is now in progress on the electrification of the Rochester division of the Erie from Rochester to Mount Morris, N. Y., 34 miles. Alternating current with overhead trolley wire will be used; the current is to be bought from one of the Canadian Niagara power plants, about 70 miles distant. Ordinary passenger cars are to be rebuilt and mounted on motor trucks and an hourly service in each direction is to be established. Freight trains will be hauled by steam locomotives as before. Sharp competition of parallel electric roads is the cause of making the change.

So far, therefore, as the steam roads are concerned, the present situation and prospects are quite clear. The costs of electric installation and operation must be largely reduced by further developments in the science, before electricity is available for main line working, except under some such special conditions as have been mentioned. Meanwhile, the experiments being made with rail motor cars indicate a possibility of additions to public convenience and comfort, together with a reasonable return to the railroads.

#### THE PRESENT RESULTS OF THE NEW RATE LAW.

We referred briefly last week to the promising beginning that had been made both by the railroads and by the Interstate Commerce Commission. But the importance of the subject justifies our recurring to it at greater length.

The principal subjects dealt with by the Act seem to be four in number: The abolition of dishonest rates; the readjustment of rates which, though open and honest, are shown to be unreasonable and improper; the regulation and standardization of reports and accounts; and last, the enforcement of through routes and joint rates. To deal with these four subjects seriatim:

It seems a strong thing to say that the mere passage of the law has already effected the first purpose, namely, the abolition of dishonest rates. But such inquiry as we have been able to make tends to show that the statement is not too strong. We have found among railroad officers a consensus of opinion that rebates are dead. "Certainly," say they, "there are none being given on our own road; we do not believe that they are being given by other roads." Further, we find a very general belief that they are not only dead but will stay dead. For this expectation, which is, it may be noted, too optimistic for Wall street to share it, various reasons are given. The main reason is that both railroad men and freighters have shared in the moral awakening that has affected the whole country and have come to see that the giving of secret rebates is a pretty mean form of cheating. But it is further said that railroad men are now realizing for the first time that with the support of law business can be carried on without rebates, and that to grant them is not merely a crime but a blunder. And lastly, it is pointed out that the prospect of fine and imprisonment is a real deterrent. The administration, it is assumed, would like nothing better than to put a prominent railroad man in jail. And if he gives rebates he stands an exceedingly good chance of getting there. For in some cases at least it has been openly declared by railroad officers that if any evidence of the giving of rebates is found it will be promptly passed on to the Interstate Commerce Commission, though in one instance a prominent official admitted

that he would probably warn his rival and give him a chance to amend his ways before handing him over to public justice. So far, then, as rebates are concerned we sum up the situation by saying that the railroads are on the side of law and honesty; the would-be law breakers have disappeared; if they reappear their colleagues will, with the help of the drastic powers of investigation possessed by the Commission, suppress them.

The second subject, that of rates which, though open and honest, may yet be held on various grounds to be unreasonable, is a much more difficult one. In the past it cannot be said that all of the decisions of the Commission have been conspicuous for their wisdom. On the other hand, it must be admitted that the railroads have often neglected opportunities to make them wiser. Sometimes the railroad men have adopted an attitude of open hostility; more often an attitude of contemptuous superiority. We have even heard it suggested that the comparative intelligence and authority of the railroad president and the railroad commissioner might be measured in the ratio of their respective salaries. The day for this is, we hope and believe, past. The powers of the Commission have undoubtedly been enlarged; the courts will presumably treat their decisions with more respect than hitherto. Moreover, the Commission seems in its recent actions to be inclined to show the gentleness of conscious strength, modified still further by conscious lack of knowledge. It apparently will endeavor in future to guide the railroads rather than drive them. And the wiser men in the railroad world are, we think, prepared to be guided. Take such a case, for example, as the rates from the East to Colorado and Californian points respectively. Students of the theory of railroad rates know well that a rate to Denver higher than the rate to San Francisco can be abundantly justified on economic grounds. But the man in the street at Denver thinks he knows that it is a cruel and deliberate injury to his city. Now the Commission represents the man in the street. But it also can understand the strength of the railroad case. Is it too much to hope that by concession of some part of what pure economic considerations would justify—a concession that in these days of 10 per cent. dividends on the Union Pacific could well be afforded—the railroads will satisfy the Commission and enlist its authority in support of the essence of the present system as distinguished from its detailed application? Take again such questions as the basing point system in southern territory, or the special import and export rates which are to Boston a matter of life and death. It looks as if frank discussion of these matters with the Commission might, in the present temper of both parties, result in the establishment of a *modus vivendi*, which would on the one hand preserve from a revolutionary disturbance the local interests both of the carriers and the freighters, and on the other hand satisfy the public that the matter had been dealt with from a broader standpoint than that of merely sectional interests.

In the matter of account keeping there is even more positive ground for hope. In its eagerness to stamp out secret rebates Congress has gone so far as to enact that "it shall be unlawful for carriers to keep any other accounts, records or memoranda than those prescribed or approved by the Commission," a provision which, in the hands of an unreasonable body, might have plunged many accounting departments in the country to chaos. The Commission has already notified the roads that it approves in advance all the accounts they are keeping at the present time, and has shown its determination not to make any changes without ample deliberation and full consultation with the officers of the roads themselves. The letter written by Professor Adams, as representing the Commission, to the chief accounting officers of the different roads in its conciliatory and businesslike tone is a model of what such a communication should be. When we learn that officials of some of the leading roads are suggesting that the existing returns should be not only made uniform and more accurate, but also made more full and comprehensive, we see every reason to hope that in this matter at any rate Commission and carriers will work in harmony.

We have left to the last the discussion of what may hereafter prove to be the most important of all the provisions of the new Act, Section 4, which for the first time empowers the Commission to establish through routes and joint rates and prescribe the division of such rates. There is, it is true, a limitation on this sweeping power in the words, "provided no reasonable and satisfactory through route exists." This raises the interesting question, what is a through route? In English law—and English and American railroad law are quite alike, the actual words being often borrowed by the one country from another, a through route is a route over the roads of two separate companies. A route, however long, is

a local route if it belongs to one company. It is a through route, however short, if it belongs to two. From Portland, Oregon, to New Orleans is a local route. From Mount Vernon to 125th street, New York City, is a through route. And such seems to be the meaning of the words "through route" in Section 2 of the Hepburn Act. The Commission appears, therefore, to have power to give a connecting company the right to use, say, the Pennsylvania terminals in Pittsburg, or the New York Central freight stations at Thirtieth street and St. Johns Park in competition with the owning company on terms to be fixed by the Commission at its discretion. In England this power has been actually exercised in cases which to an ordinary railroad man would seem as unreasonable as would be the instances suggested above. What view the Commissioners here will take must remain to be seen when a concrete case comes before them. But it is safe to say that the better the relations between the Commission and the carriers, the less likely they are to adopt a course of action which would offend the sense of justice of all conservative railroad officers.

On the whole we think the outlook for the future is bright, and we hope that the Commission and carriers combined will be able to put a stop to the abuses which have been largely responsible for anti-railroad legislation and anti-railroad sentiment, and may help the railroads to regain the place in public esteem to which the splendid courage and energy with which they have been developed and the admirable efficiency with which they are operated should surely entitle them.

While the western half of the world has been absorbed in the Harriman dividends and the Hill ore deal, India, it seems, has been rent in twain by a heated controversy which has been waged through the columns of the lay and technical papers of that country. A recent editorial in *Indian Engineering* takes up the question, which is: Shall tonga service to Simla be abolished? If we only were familiar in daily life with a tonga, we might also treat the subject editorially. But in the absence of this necessary basic technical knowledge we can only state the facts in the case as we understand them. A cart road 60 miles long runs from Kalka to Simla, the summer capital. The road was built about 50 years ago and suffers continually from floods; on an average of once in seven years it is completely tied up by landslides. In unavailing efforts to avoid these annoyances it is sometimes bodily shifted across to the opposite side of the valley in which it makes its first steep ascent from Kalka. Through this hospitable country, the Kalka-Simla Railway was built not many years ago. It has now been suggested that the railroad can carry passengers with more regularity than the tongas on the cart road can. The progressive lay papers took up the suggestion enthusiastically, reviewed the disastrous history of the cart road, attacked the weather bureau and charged the tonga management with cutting into the railroad's passenger business. This frenzied competition took a weird turn: the second class fare on the railroad was fixed at 25 per cent. more than the tonga fare; the tonga company saw the railroad and raised them 20 per cent. At this crucial point, it began to be realized that the total daily carrying capacity of the tonga line was six passengers each way and the excitement died away. Sober afterthought is to the effect that perhaps it will be best to suspend judgment on the proposed abandonment of the cart road until the railroad also has been left out in the rain for a few years longer.

#### Texas Central.

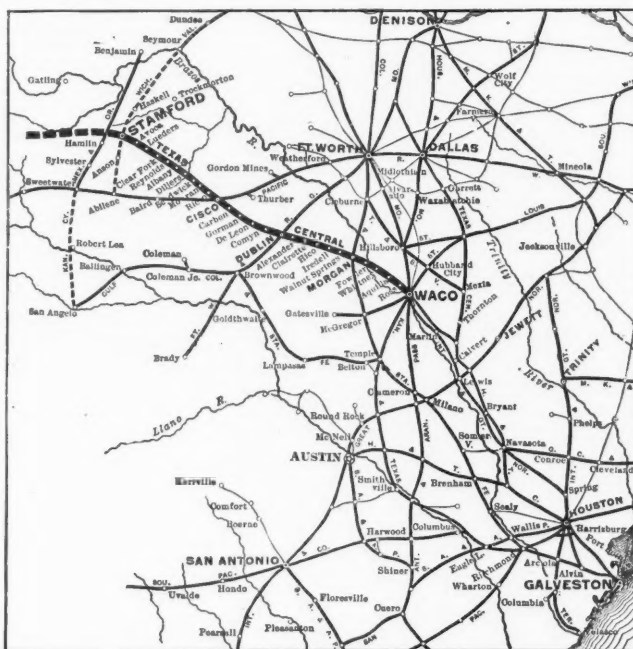
The Texas Central was incorporated in 1879, and 230 miles were built, running from Ross, Tex., northwesterly to Albany, 178 miles, with a 52-mile branch from Garrett to Roberts. The company went into the hands of a receiver in 1885 and was sold under foreclosure in 1891, being bought for \$750,000 by the interests now in control. In 1893, just after the property was turned over to the reorganized company, the branch line was acquired by the Texas Midland. In 1900, the Texas Central was extended from Albany west to Stamford, 39 miles, and in 1902 the eastern end of the road was extended from Ross to Waco, 11 miles, the last named town having up to that time been reached with trackage rights over the Houston & Texas Central. The road is now being extended from Stamford west 42 miles. The right of way has been secured, material purchased and grading is nearly finished. Track laying began in July, and it is expected that the line will be in operation by the first of December. The Wichita Valley is building a line from Seymour south to a connection with the Texas & Pacific, at Abilene, crossing the Texas Central at Stamford. The Kansas City, Mexico & Orient has built a branch from Sweetwater north, which crosses the extension of the Texas Central a few miles west of Stamford. The new extension is being built to get the traffic which will come over these two new lines and also to build up the country west of Stamford, which is being rapidly settled.

A large proportion of the traffic of the road is in lumber and

cotton. The number of tons of these commodities carried during the year ended June 30, 1906, show large increases over 1905. The total tonnage was 237,487, an increase of 26,133 tons.

Both freight and passenger earnings for 1906 show substantial increases. Freight earnings increased from \$571,623 to \$612,206, or 7 per cent., and passenger earnings from \$215,435 to \$284,404, or 32.7 per cent. The operating ratio dropped from 64.8 per cent. to 59.3 per cent., operating expenses having increased only 4.6 per cent. The greatest saving was in maintenance charges. Maintenance of way per mile cost \$767 during the past year against \$804 in 1905, while maintenance of equipment works out as follows: Maintenance of locomotives per locomotive, \$2,092; maintenance of passenger cars per car, \$461, and maintenance of freight cars per car, \$79. The last two items have decreased, but in 1905 new equipment was charged to these accounts. Conducting transportation cost increased 11.7 per cent.

The company has outstanding \$2,675,000 common stock, \$1,325,000 preferred stock, \$1,150,000 first mortgage 5 per cent. bonds, and \$150,000 first mortgage 4 per cent. bonds. Five per cent. annual dividends are paid on each class of stock. The balance after dividends and charges on June 30, 1906, was \$141,230, from which was deducted \$115,269 for new equipment and improvements, and \$9,129 for tax on gross receipts. This last sum consists of a tax of 1 per cent. on the gross receipts for the year ended June 30, 1905, plus a penalty of 10 per cent. levied on account of the failure of the company to pay the tax on the prescribed date. This was because



Texas Central.

the law, which was passed in the last session of the Texas Legislature, is still being contested in the courts, and the railroad company finally paid it under protest, pending decision on the constitutionality of the act. The net surplus for the year was \$31,357 as compared with \$48,312 in 1905, when no appropriation for new equipment and improvements was made out of net earnings.

The principal statistics of operation follow:

	1906.	1905.
Mileage worked .....	227	227
Freight earnings .....	\$616,206	\$571,623
Passenger earnings .....	284,404	215,435
Gross earnings .....	945,241	827,380
Maint. way and structures .....	174,182	182,537
Maint. of equipment .....	78,791	75,125
Conducting transportation .....	274,260	245,624
Operating expenses .....	560,614	535,731
Net earnings .....	384,627	291,649
Surplus for the year .....	31,357	48,312

Chicago, Milwaukee & St. Paul.

More striking perhaps than anything which is said in the annual report just issued is the fact that in it no mention whatever is made of the 1,500-mile extension now under construction from the northernmost point in South Dakota at which the St. Paul reaches the Missouri river to the Pacific coast at Seattle. There is an indirect reference to the extension, however, in one of the items on the general balance sheet, where it is noted that the stock of material and fuel on hand, whose value has increased over \$2,000,000 above the figure at June 30, 1905, includes about \$2,500,000 for material accumulated for the construction and equipment of extensions. The item of cash on hand at the same time has decreased by over \$3,000,000. Still another item among the assets

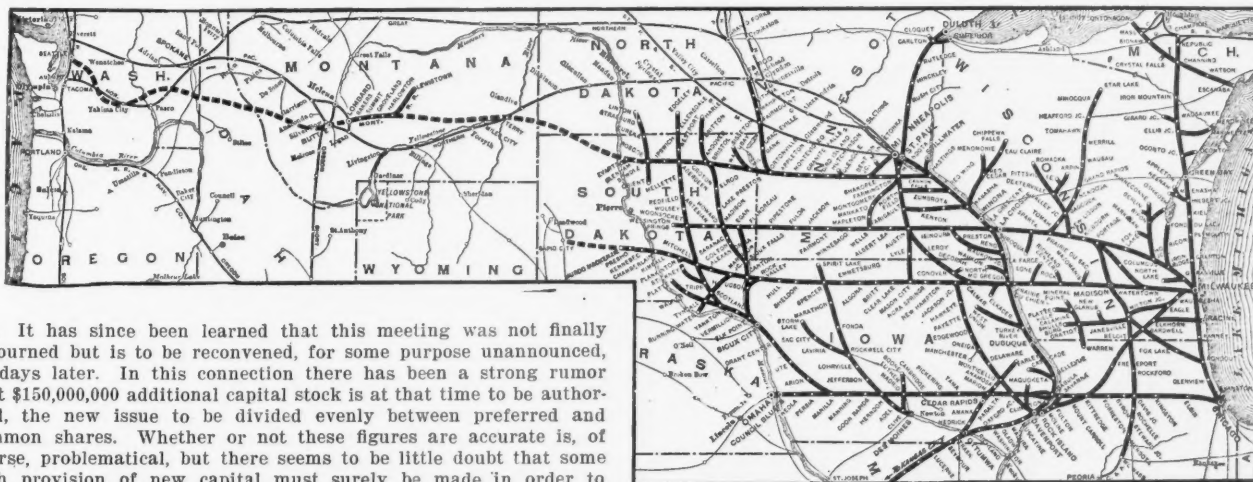


—one which did not appear in 1905—may be traced to the same source. This is the sum of \$9,463,816, "advances to other railroad companies," which probably represents sums already invested in the different parts of the new extension. In fact, the impression, due to the failure of the company to allude to this most important extension of its mileage and influence, that the project has been abandoned is entirely a mistaken one. Besides the fact that surveys and construction work are both being carried on on several sections of the new extension, the company has incorporated the new line in South Dakota, Montana, Idaho and Washington, the four states through which, in addition to a few miles in the southwestern corner of North Dakota, it is to run. More than this, an official map of the road, published this month by the passenger department and reproduced herewith, shows the location of the new extension as far as Butte, Mont., including the Montana Railroad, which runs from Lombard, Mont., to Lewiston, 157 miles, which was lately acquired and which is, after necessary improvements, to be used—most of it—as part of the new through line. The probable location of the line from Butte to Seattle is also traced on the map. It was shown more in detail in the map of railroad construction in the state of Washington published in the *Railroad Gazette* of October 5.

The main question which is at the moment of interest in regard to the extension plans is as to the method of obtaining funds to cover its cost. Since the close of the fiscal year it has been announced that the \$25,000,000 authorized, but unissued, common stock which has been held in the treasury of the company since 1902, will be issued to stockholders at par. This amount, however, is not sufficient to cover the whole cost of the Pacific extension. The annual meeting of the company was held last week and closed without public announcement of any further provision of new capi-

maintenance of way were in repairs of roadway, \$400,000, rails, \$173,000, and ties, \$83,000. The expenditures for rails included 46,607 tons of new rails costing \$1,328,070, against 31,750 tons laid in 1905 costing \$886,752. During the year 46 steel bridges, aggregating 6,297 ft. in length, were built, and over 8,000 ft. of pile bridges were filled with earth. Maintenance of way cost \$856 per mile against \$773 in 1905, but even this seems only a fair figure. Maintenance of equipment expenses include \$694,646 charged to operating expenses to replace equipment destroyed during the year—about the same sum as was charged for this purpose in 1905. The principal increases under conducting transportation were in engine and roundhouse men, \$232,000; fuel and other supplies for locomotives, \$283,000; train service and supplies, \$156,000; switchmen, flagmen and watchmen, \$183,000; station service and supplies, \$260,000, and use of cars and locomotives, \$125,000. This last item shows an increase of something over 100 per cent. over the 1905 figure, an increase which, largely representing as it does the freight car service balance, is rather hard to explain, except on the theory that foreign cars were more extensively used during the notable car shortage which prevailed in granger territory while the crops were moving last season. The average cost of repairs and renewals was \$1,454 per locomotive against \$1,538 in 1905; of passenger cars, \$663, against \$592 in 1905, and of freight cars, \$46, against \$42 in 1905. The increase in the freight car figure brings payments under this head to a more satisfactory level.

The principal increases in tonnage carried were in the following commodities: Flour and other mill products, 200,000 tons; wheat, 153,000 tons; barley, 105,000 tons; oats, 163,000 tons; corn, 65,000 tons; dressed meats, 135,000 tons; bituminous coal, 370,000 tons; coke, 168,000 tons; iron and other ores, 157,000 tons; sand, stone, etc., 175,000 tons; lumber, lath and shingles, 143,000 tons,



Chicago, Milwaukee & St. Paul.  
Showing probable location of Pacific extension.

tal. It has since been learned that this meeting was not finally adjourned but is to be reconvened, for some purpose unannounced, 30 days later. In this connection there has been a strong rumor that \$150,000,000 additional capital stock is at that time to be authorized, the new issue to be divided evenly between preferred and common shares. Whether or not these figures are accurate is, of course, problematical, but there seems to be little doubt that some such provision of new capital must surely be made in order to provide the road with a comprehensive fund from which to finance the great amount of new work involved in its expansion project. Particularly is this so because while this year has been spent in the more preliminary work of construction, the open months of 1906 should see rapid progress in the actual and more expensive work of grading and track laying.

The earnings' record of the present system is a highly satisfactory one. With an increase of 53 miles in the average mileage operated, gross earnings increased from just below \$50,000,000 in 1905 to over \$55,400,000, a gain of more than \$5,500,000. Operating expenses were larger by \$4,051,894, leaving net earnings of \$20,709,451 against \$19,222,406, an increase of \$1,487,045. There were at the same time two large charges made to income account for betterments, neither of which the year 1905 can match with similar appropriations. Renewal and improvement account received \$1,511,758, and there was \$2,540,467 appropriated for replacement of 3,662 old small capacity box cars which were dropped from the equipment inventory at the end of the year, minus cost of certain cars charged to income account in previous years. Against a similar charge of \$619,960 in 1905 there was also an appropriation of \$712,331 out of earnings for additions to property. Two further charges representing deferred tax payments, postponed pending settlement of litigation, were \$450,000 paid the state of Wisconsin for the years 1904 and 1905 and \$191,567 paid the state of Michigan for the years 1902 to 1905 inclusive. Even after all these larger appropriations, there was a profit and loss balance for the year of \$7,000,000, against one of \$8,100,000 in 1905. In 1906 the road earned 14.4 per cent. on its capital stock, as compared with 11.5 in 1905.

With the exception of general expenses, costs of operation were larger in each of the accounts. Maintenance of way cost \$5,955,000, an increase of \$618,806 over 1905. Maintenance of equipment (\$5,598,000) increased \$416,460. Conducting transportation cost \$19,700,000, an increase of \$1,418,923. The principal increases under

and iron and steel, 306,000 tons. There was a total increase in tonnage of 2,398,000 tons, or 12 per cent. The principal decrease, suggestive of the Chicago packing house investigation, is in packing house and animal products other than dressed meats, which decreased 118,435 tons, or 28 per cent. The revenue train load was 282 tons against 265 tons in 1905, an increase of 6.5 per cent. Including company freight, the train load was 320 tons against 296 tons in 1905. There was an increase of 4 per cent. in the number of tons of revenue freight carried per loaded car. Both ton mile and passenger mile rates show slight decreases from 1905.

During the year over \$2,500,000 was charged to capital against the construction of new lines (not including any part of the Pacific extension). On the extension from Chamberlain, S. Dak., on the Missouri river, west to Rapid City, 219 miles, 75 miles to Murdo Mackenzie have recently been put in operation. Another line in the nature of a cut-off, in South Dakota, from Madison to Renner, just north of Sioux Falls, 34 miles, is nearly completed, more than 20 miles being already in operation. There were opened during the year the extension of the Armour branch from Armour, S. Dak., to Stickney, 21 miles, and a six-mile extension of the Gleason branch, in Wisconsin. The mileage was also added to by purchase of a line of road extending from Oglesby, Ill., to Granville, 11 miles. The principal roadway improvements include second main track now under construction on the La Crosse division from Watertown Junction, Wis., just west of Milwaukee, to Portage, 47 miles, and on the River division from River Junction, Minn., where the Milwaukee line strikes the Mississippi river, to Richmond, 10 miles, and from Lake City, Minn., to Wabasha, 12½ miles, these three pieces of double-track work being on the main line from Chicago to St. Paul and Minneapolis. Extensive reduction of grades and

improvements in alinement are being carried on at various points on the main line to Omaha in Iowa, the Chicago-Milwaukee division and the River division. Against such improvements there has been charged to renewal and improvement account \$644,743. Elevation of the tracks used jointly with the Pittsburg, Cincinnati, Chicago & St. Louis from Western avenue, Chicago, to Elizabeth street, and of the road's own tracks from Western avenue to Grand avenue—is just about completed. Renewal and improvement account was charged with \$501,678 during the year to cover these expenditures, as well as with \$521,700 for an additional ore dock 1,410 ft. long at Escanaba, Mich. There have also been important improvements to the company's shops, at an aggregate cost of \$414,661, most of which was charged to capital account.

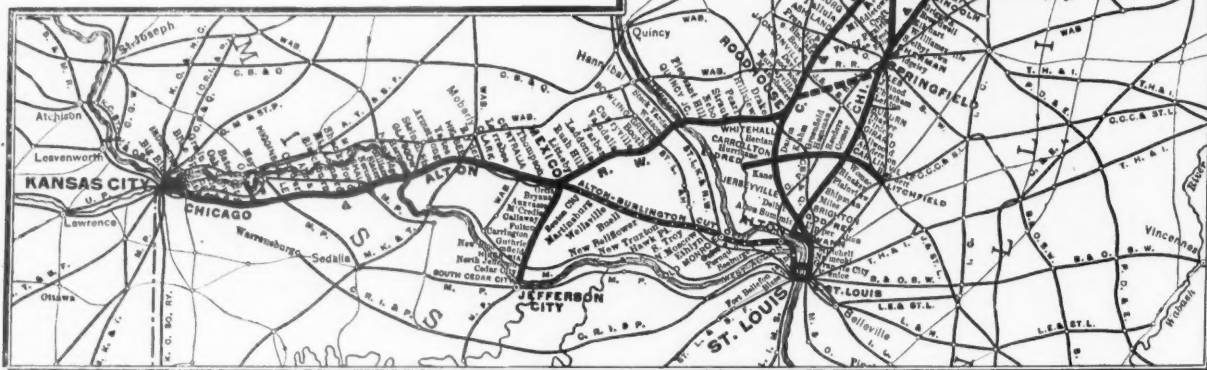
The principal results of the year's operation are summed up in the following table:

	1906.	1905.
Mileage worked .....	6,961	6,908
Freight earnings .....	\$40,187,710	\$35,968,946
Passenger earnings .....	11,123,545	10,126,958
Gross earnings .....	55,423,053	49,884,114
Maint. way and structures .....	5,955,432	5,336,626
Maint. of equipment .....	5,598,046	5,981,586
Conducting transportation .....	19,699,381	18,280,458
Operating expenses .....	34,713,602	30,661,708
Net earnings .....	20,709,451	19,222,406
Net income .....	13,323,231	11,858,826
Surplus for the year .....	7,009,896	8,114,970

#### Chicago & Alton.

With an increase of 55 miles in operated mileage during the year, due to including the road from Eldred to Litchfield, formerly operated by the Quincy, Carrollton & St. Louis, both gross and net earnings of the Chicago & Alton show a decrease during the last year. Freight earnings increased from a little less than \$7,000,000 in 1905 to \$7,500,000, in spite of the miners' strike, which lasted through April and May, during which coal movement was almost nil. Passenger earnings, however, fell from \$4,185,000 to \$3,410,000, a decrease of over \$175,000, or 19 per cent., accounted for by comparison with the previous year, which included the most profitable part of the Louisiana Purchase Exposition travel to and from St. Louis. The decrease in total earnings was \$211,219, and as operating expenses increased slightly more than this, there was a falling off in net earnings of \$427,460, or 10 per cent.

The most striking increase among the expense accounts is that in cost of conducting transportation. The accounts especially affected were: fuel for locomotives, which increased 11.5 per cent.; train service, 11 per cent.; engine and roundhouse men, 7 per cent.;



Chicago & Alton.

switchmen, flagmen and watchmen, 9 per cent., and train supplies and expenses, 10.4 per cent. At the same time there was a decrease of 21 per cent. in cost of advertising and 20 per cent. in switching charges. The increases reflect higher rates of wages, a condition now affecting most railroads. Maintenance of way and structures shows a small decrease for the year. The principal decreases were in the items of renewals of rails, ties and ballast, which decreased respectively 45 per cent., 15 per cent. and 28 per cent. from the 1905 figures. The cost of the first item includes the relaying of 85 miles of track, mostly with new rail. The most important increases under roadway maintenance were in cost of spikes and fastenings, bridges and culverts, and buildings and fixtures, which respectively increased 88 per cent., 34 per cent. and 12 per cent. Per mile of road maintenance of way cost \$1,472 against \$1,599 in 1905. Figures are presented showing that during the last seven years main track renewals of ties covered 77 per cent. of the mileage, of rails 70 per cent., of ballast 57 per cent., of joints 87 per cent., of switches 108 per cent., and of frogs 136 per cent. There are of the road's mileage 747 miles of main track laid with 80-lb. rails and 631 miles ballasted with stone.

Maintenance of equipment, which increased 5 per cent. over the previous year, cost \$3,234 per locomotive against \$3,199 in 1905;

\$671 per passenger car against \$632 in 1905, and \$48 per freight car against \$46 in 1905. There were bought during the year 38 locomotives (five Atlantic, 20 consolidation and 13 switching), and 16 passenger train cars. It is not clear whether they were charged to earnings or capital account. Through car trusts, 100 box cars of 80,000 lbs. capacity, 200 refrigerator cars of 60,000 lbs. capacity, and 300 stock cars were added to the equipment. There are now on order 1,300 box cars and 300 flat cars, both of 80,000 lbs. capacity, and 300 stock cars and 100 furniture cars, both of 60,000 lbs. capacity.

The most important feature of the year's progress is the large amount of improvement work done on the line. Second main track on the Coal City loop was put in operation, thus giving, including this line, a double track between Chicago and Bloomington, Ill., 127 miles. Preparatory to laying second track from Bloomington to Sherman, 51 miles, and at the same time reducing the maximum northbound gradient to 0.3 per cent., 870,900 cu. yds. of earth excavation have been put in place for new roadbed and 1,381 cu. yds. of concrete have been used in extension, replacement and repairs of old culverts and bridges. All track and switch material is distributed on the ground for 33 miles of new main track, 10.4 miles of which are already ready for traffic. The steel superstructure for a new double-track bridge over Walnut creek, south of Lincoln, is

on the ground and nine 64½-ft. spans have been erected on the south-bound track ready for service. The material for Kickapoo creek bridge, north of Lawndale, three 70-ft. spans, is also on the ground. Work on the Sangamon river bridge for the northbound track north of Springfield, consisting of eight deck plate girder spans on concrete abutments to replace the old pile trestle and old river span, is in progress. Four concrete arches have been substituted for wooden trestles between Sherman and Grove, and the trestle approaches at Mackinaw river bridge, north of Green Valley, have been renewed for 1,155 ft. with treated timber. Double-track has been laid through Springfield south to Iles, 1.8 miles, making the double-track continuous from Sherman to Iles, 9.8 miles. Thus, on completion of the section from Sherman north to Bloomington the double-track, with 0.3 per cent. maximum northbound grade, will be continuous from Chicago to Iles, 187 miles. Iles is at the center of the coal mining industry and is the northern terminus of an air line cut-off now under construction to a point near Murrayville, on the Kansas City division, which is to be put in operation by the end of the year. Surveys have also been made through the coal district between Springfield and Nilwood for double-track and with a view to reducing northbound grades to the same maximum. It is expected that with the exception of 23 miles from Lawndale north



to Bloomington by December 1 of this year the double-track and grade reduction will be continuous from Iles to Chicago. Completion of the cut-off from Springfield to Roodhouse (Iles-Murrayville) should bring the Kansas City line into closer and easier connection with the main line of the system.

On March 14 of this year the old Chicago & Alton Railroad Company was consolidated with the Chicago & Alton Railway Company, the then operating company, under the name Chicago & Alton Railroad Company. When the Railway Company was organized it acquired a large block of stock of the Railroad Company for the purpose of consolidating the two. By the consolidation agreement the stockholders of the Railway Company exchanged their stock,

#### The New Allegheny Engine Terminal of the P., F. W. & C.

In connection with track depression work at Allegheny, Pa., which has been in progress for some time past, the Northwest System of the Pennsylvania Lines West of Pittsburgh has lately finished some complete engine terminal facilities, including a 41-stall engine house, and a large coaling plant of the Robins conveying type. The accompanying interesting view of the roundhouse was taken from this coaling plant, which is quite close to the roundhouse. The coaling plant can serve engines on four tracks at once. It will be observed that these four tracks reduce to two as they approach the turntable, and that the latter is accessible



New Allegheny Engine Terminal of the Pennsylvania Lines West, North-West System.

share for share, for the preferred and common stock of the consolidated company. The stockholders of the old Railroad Company have the privilege of exchanging their stock for cumulative 4 per cent. prior lien and participating stock (total issue, \$889,300) of the new company, on a basis which, according to the statement in the report, will yield them higher returns than they have received or are likely to receive if they retain their old certificates—a rather broad hint of the desirability of such a course. The advantages of the consolidation are the saving in unnecessary administration expenses and the unifying of the financial affairs of the railroad, which were complicated by being divided between two different companies. One result of the consolidation is shown in the profit and loss account of March 13, 1906, the day before the consolidation was made, which shows that the total (\$2,500,000) profit and loss surplus of the two companies on that date was written off against unfunded discounts of each of the two companies and old accounts.

The report states that freight tonnage increased 16 per cent. and increased revenue from this account would have amounted at the 1905 rate to \$1,134,703. On account of the decrease of one-half of a mill (0.05 cents), or 7 per cent. in the average ton-mile rate the increase in revenue was only \$542,154. Freight receipts per train mile, however, increased from \$2.39 in 1905 to \$2.45 last year, a gain of 2.5 per cent. The passenger mile rate, owing to the low rates given on Exposition travel, rose 18½ per cent., from 1.73 cents in 1905 to 2.05 cents in 1906. Passenger train receipts per train mile, however, decreased 20 per cent., from 1.48 cents in 1905 to 1.18 cents last year. The freight density increased 107,542 tons, or 10 per cent., and the passenger density decreased by 93,276 passengers one mile per mile of road, or 35 per cent. The average number of passengers per train mile showed exactly the same decrease of 35 per cent., or from 75 in 1905 to 49 last year. In spite of the increase of 16 per cent. in revenue ton mileage, freight train mileage increased only 5 per cent. The average revenue train load was 381 tons against 347 in 1905, and, including company freight, 418 tons against 374 tons in 1905, increases of 10 and 11 per cent., respectively, which show already the result of the betterment of grades on the line between the coal producing region and the principal market for the Alton's coal at Chicago.

The principal results of the year's operation are summed up in the following table:

	1906.	1905.
Mileage worked .....	970	915
Freight earnings .....	\$7,501,081	\$6,958,927
Passenger earnings .....	3,410,443	4,185,561
Gross earnings .....	11,586,095	11,797,314
Maint. way and structures .....	1,427,875	1,463,689
Maint. of equipment .....	1,407,675	1,336,211
Conducting transportation .....	4,654,077	4,469,846
Operating expenses .....	7,818,904	7,602,663
Net earnings .....	3,767,191	4,195,651
Net income .....	1,009,980	933,167

from three separate tracks. The turntable is motor-driven. The view also shows the water cranes between the pairs of coaling tracks, and the ash hoist in the foreground on the left. The photograph was sent us by Mr. R. Trimble, Chief Engineer Maintenance of Way.

#### Railroad Decisions in September.

*Connecting lines operated as a single system.*—Where numerous lines are operated as a single system by one railroad, though the general management of each road is retained by its owners, the relation between the subordinate companies and the operating company is that of principal and agent with respect to traffic originating on the constituent lines, and the operating company is directly liable for an injury to one employee in unloading one of its own cars on the tracks of one of the constituent lines through the negligence of the employees of the latter. *Lehigh Valley vs. Delachesa*, 145 Fed. Rep. 617.

*Inspection of bumpers.*—A railroad company owes to brakemen in its employ the duty of inspecting the bumpers of freight cars where it is aware that the bumpers are used as steps by brakemen while coupling cars. *Lyle vs. Alabama Great Southern*, Fed. Rep. 611.

*Speed of trains on dry and windy days.*—A railroad is under no obligation to diminish the customary speed of its passenger trains on dry and windy days in order to decrease the likelihood of starting fires through sparks thrown from locomotives, at least in the absence of some evidence of danger of fire due to the speed of the train. *Woodward vs. Chicago, Milwaukee & St. Paul*, Fed. Rep. 577.

*Automatic couplers.*—The automatic coupler act applies to all cars regularly used on any railroad engaged in interstate commerce not only while actually being used in such commerce but at all times when in use. *United States vs. Great Northern*, 145 Fed. Rep. 438.

*Criminal liability for accepting rebate.*—A person accepting a rebate in violation of the Elkins act cannot escape criminal liability therefor on the ground that he received no benefit from it but turned it over to another without consideration. But the mere fact that a defendant in a prosecution under the act was a stockholder in a corporation accepting a rebate does not render him subject to the penalty imposed by the statute. *United States vs. Wood*, 145 Fed. Rep. 405.

*Damages to abutting property as preference in insolvency.*—A claim for damages to abutting property resulting from construction of a railroad has priority over a mortgage of the road and is entitled to preference in the distribution of proceeds of the property when sold in foreclosure proceedings. *Fordyce vs. Kansas City & Northern Connecting Co.*, 145 Fed. Rep. 566.

**Preferential claims.**—A general creditor of an insolvent railroad company is not entitled to preference over a mortgage which covered not only the corpus of the railroad property of every kind and description, but also the net income after deducting current operating expenses, unless the debt was contracted upon the faith of being paid from the current income and not created for construction or ordinary equipment. And even when so contracted as a general rule these creditors are not entitled to preferential payment over the mortgage from the proceeds of the property at foreclosure sale where less than the mortgage debt is realized, unless there has been a diversion of net income to the benefit of mortgagee which the claimant must show to be a fact. *Fordyce vs. Omaha, Kansas City & Eastern*, 145 Fed. Rep. 544.

#### Distant Switch Signals on the Union and Southern Pacific.

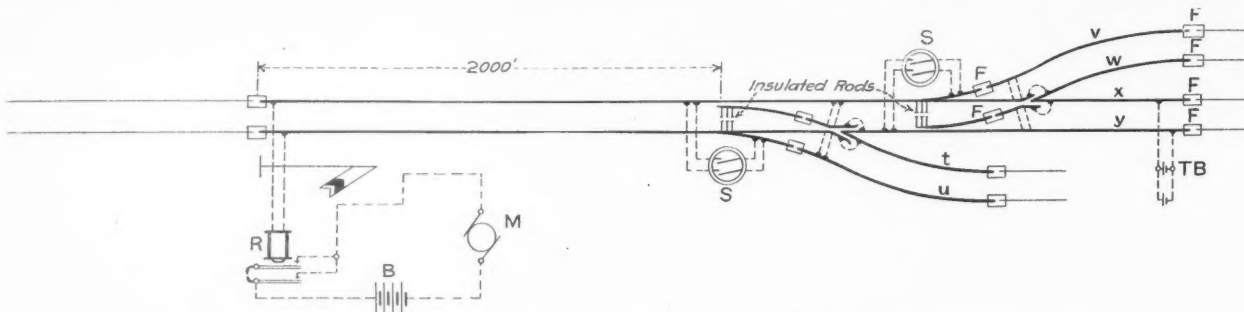
The determination of the officers of the Union Pacific, the Southern Pacific and the other lines controlled by these to fully equip their lines with signals to protect facing point switches which have no connection with interlocking, has already been noticed in these columns. The plans for this work have been so far carried out that 185 signals have already been set up, and more than 600 others will be installed before the first of next January, making something like 800 switches protected. These signals are, of course, not on the lines over 800 miles in extent, which are equipped with automatic block signals.

The diagram shown herewith illustrates the standard arrangement. The connection from the switch to the distant signal is by track circuit, and the apparatus and fixtures now installed will be available for and become a part of the automatic block system when such system is extended to the lines in question.

On some parts of the Southern Pacific the use of ordinary mechanical wire connections between switch and distant signals was found troublesome by reason of the heavy snowfalls in the winter,

February 26, 1906, changes the definition of "main stem" so as to exclude passenger stations and freight buildings. In the case of canals the "waterway" includes the towing-path and bermebank. "Other real estate" includes roadbed (namely, roadbed other than main stem), waterways, reservoirs, tracks (sidings), buildings, water-tanks, waterworks, riparian rights, docks, wharves and piers. Tangible personal property includes rolling stock, canal and ferry boats, tools and machinery necessary for and used in state commerce. Franchises include intangible values, and are estimated by the State Board of Assessors presumably at 60 per cent. of the excess, if any, of the value of the securities (bonds and stocks) over the assessed value of main stem, other real estate, and tangible personalty. Stocks and bonds are, by law, practically exempt. With the exception of "other real estate" commonly spoken of as "property of the second class," the tax rate on the dollar of assessed value as determined by the State Board of Assessors was by the act of 1884 fixed and limited at one-half of 1 per cent. The revenue so raised went into the state treasury for state expenses. On property of the second class—namely, "other real estate"—there was also levied a state tax of one-half of 1 per cent. But in addition this property of the second class was liable to a tax for local purposes not to exceed 1 per cent. upon the dollar of valuation as determined by the State Board of Assessors. Beginning in 1897, the entire tax derived from property of the second class was paid over to the various taxing districts traversed by a railroad or canal, each district receiving the tax raised on the State Board of Assessors' valuation of that segment of railroad or canal located within the local taxing district concerned. In 1905 property of the second class was subjected to taxation at the prevailing tax rate in the local taxing district. The assessment of this class of property (real estate other than main stem) continued to be made by the state board; but the previous maximum limit on the local tax rate (1 per cent.) was done away with.

In 1904, complaint had grown acute with respect to what was claimed to be the unfair privilege enjoyed by railroads in the mat-



Standard Arrangement of Electric Circuits for Distant Switch Signals on the Harriman Lines.

and for this reason it was decided to make all connections by means of the track circuit.

In the example shown in the drawing there are two switches, but the arrangement, in principle, is precisely the same as for one switch or any number of switches. The switch instruments (s) have double wire connections and the control of the signal motor (m) by the track relay (r) is also safeguarded by the use of two armatures on the relay. The rails of the side tracks (t, u, v, w) are included in the circuit as far as the fouling points (F) as usual. Rails w and x are connected together in the usual way; v and y are connected with each other, but insulated from w and x. Those parts of the track not bonded for the electric current are shown in light lines.

#### Taxation of Railroad and Canal Property in New Jersey.\*

An act passed by the legislature of New Jersey early this year is intended to alter radically the rate of taxation on railroads and canals in that state. Prior to the enactment of this act the tax rate upon the greater part of such property was by law limited to one half of 1 per cent. on the dollar of valuation. Hereafter the greater part of all railroad and canal property is to be taxed at the "average rate of taxation" imposed upon general property.

The previous limitation of the tax rate upon the greater part of railroad and canal property to one-half of 1 per cent. of their "true value" dates from 1884, when a State Board of Assessors was created. This board was required to assess the property of railroads and canals. For purposes of assessment the property of such companies was, and continues to be, divided into four classes: (1) main stem or water-way; (2) other real estate; (3) tangible personal property; (4) franchises. The "main stem" of a railroad is defined as covering the roadbed not exceeding 100 ft. in width, including rails, sleepers and passenger stations. The act of Feb-

ruary 26, 1906, changes the definition of "main stem" so as to exclude passenger stations and freight buildings. In the case of canals the "waterway" includes the towing-path and bermebank. "Other real estate" includes roadbed (namely, roadbed other than main stem), waterways, reservoirs, tracks (sidings), buildings, water-tanks, waterworks, riparian rights, docks, wharves and piers. Tangible personal property includes rolling stock, canal and ferry boats, tools and machinery necessary for and used in state commerce. Franchises include intangible values, and are estimated by the State Board of Assessors presumably at 60 per cent. of the excess, if any, of the value of the securities (bonds and stocks) over the assessed value of main stem, other real estate, and tangible personalty. Stocks and bonds are, by law, practically exempt. With the exception of "other real estate" commonly spoken of as "property of the second class," the tax rate on the dollar of assessed value as determined by the State Board of Assessors was by the act of 1884 fixed and limited at one-half of 1 per cent. The revenue so raised went into the state treasury for state expenses. On property of the second class—namely, "other real estate"—there was also levied a state tax of one-half of 1 per cent. But in addition this property of the second class was liable to a tax for local purposes not to exceed 1 per cent. upon the dollar of valuation as determined by the State Board of Assessors. Beginning in 1897, the entire tax derived from property of the second class was paid over to the various taxing districts traversed by a railroad or canal, each district receiving the tax raised on the State Board of Assessors' valuation of that segment of railroad or canal located within the local taxing district concerned. In 1905 property of the second class was subjected to taxation at the prevailing tax rate in the local taxing district. The assessment of this class of property (real estate other than main stem) continued to be made by the state board; but the previous maximum limit on the local tax rate (1 per cent.) was done away with.

The act of April 5, 1906, continues the assessment of the main stem, tangible personalty and franchise by the State Board of Assessors. The assessment of railroad property of the second class (real estate other than main stem) is hereafter to be made by local assessors. The local assessors in every taxing district of the state are now required on or before October 1 of each year to forward to the State Board of Assessors a certified statement of the total valuation of property assessed by them, each in his own taxing district, and also the rate of taxation in the district. The aggregate value of all property thus returned shall be deemed "the aggregate value of the general property in the State." The law also requires that the tax rate in each district shall be multiplied into the total property assessed therein, and the several products thus obtained shall be added, and the aggregate so ascertained shall be deemed "the aggregate taxes of the state." The "aggregate taxes of the state" thus defined shall be divided by "the aggregate value of the general property in the state," and the quotient is to constitute the "average rate of taxation" for the year. At this rate the State Board of Assessors are required to compute the tax on main stem, tangible personalty and franchise.

The probable results of the act cannot be accurately forecast.

\*Abstract of a paper published in the *Quarterly Journal of Economics*, for August, 1906, by Winthrop M. Daniels.

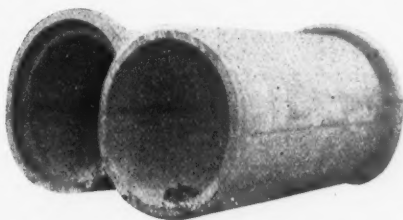


The transportation interests will probably assail its constitutionality, although the decision in the case of *Central Railroad Co. v. State Board of Assessors*, 19 Vroom, would seem to indicate that it will stand the judicial test. The railroads are said to be urging local assessors to make a higher valuation of general property in local tax districts, inasmuch as this will reduce "the average rate of taxation," and the railroad taxes in consequence. In case the law stands, it ought largely to augment the receipts of the state treasury, but just to what degree experiment alone can determine.

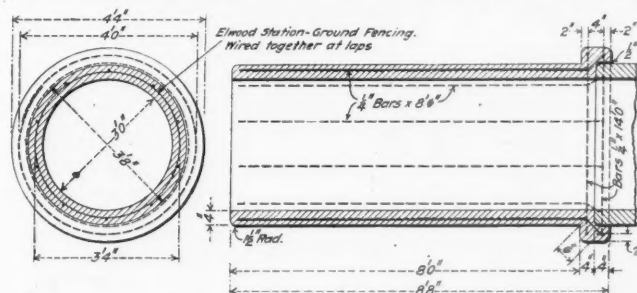
#### Reinforced Concrete Culvert Pipe on the Burlington.

In all wooden trestle elimination work that has been done recently on the Burlington Lines East of the Missouri River, instead of the usual cast-iron pipe culverts, reinforced concrete pipe has been used, at a considerable saving in expense. There has been laid to date about 6,000 ft. of this pipe in three sizes—48 in., 36 in. and 24 in. It is made in 8-ft. sections, of which the foregoing amount includes 250 sections of the 48-in., 320 of the 36-in. and 180 of the 24-in. A photograph of two finished sections of the pipe is shown, and detailed drawings of both pipe and forms.

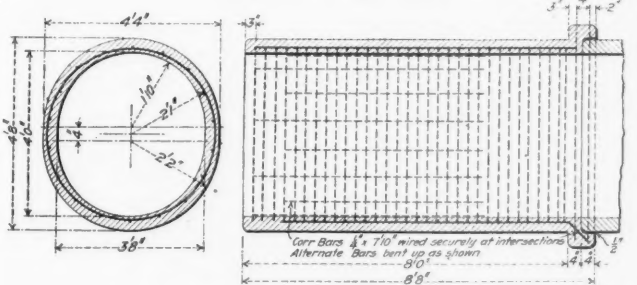
The largest size—48 in.—is reinforced with  $\frac{1}{4}$ -in. corrugated steel bars. The circular reinforcing bars are formed into individual hoops with the ends lapped 1 ft., the hoops being spaced 3 in. centers. The longitudinal bars, 18 in number, are spaced, approximately, 8 $\frac{1}{2}$  in., and alternate bars have their ends bent up at the bell end of the pipe to reinforce it at that point, as shown on the drawing. As appears from the cross-section, the pipe is made slightly elliptical, the horizontal diameter being 4 in. less than the vertical diameter. This is to enable the reinforcing hoops to occupy the position shown relative to the inner and outer surfaces at the top and bottom and the sides, respectively, properly to take care of the stresses. The increased vertical diameter is obtained by inserting a 4-in. wooden wedge strip between the halves of the form on each side. The pipe must be laid



Reinforced Concrete Culvert Pipe, C., B. & Q.



Reinforcement of 36-in. Pipe.



Reinforcement of 48-in. Pipe.

in this position, of course, and the top is suitably marked by metal letters attached inside the form.

The two smaller sizes are made circular and are reinforced circumferentially by steel wire fencing,  $\frac{1}{4}$ -in. corrugated bars being used longitudinally, however. The disposition of bars and fencing is clearly shown in the accompanying sections of the 36-in. pipe. Two pieces of the fencing are used, one being 58 in. wide and the other 34 in., wired together at the laps. The length over all of each of the sizes is 8 ft. 8 in.

A 1:4 $\frac{1}{2}$  mixture of gravel concrete is used. It is applied very wet, in small quantities at a time, and spaded. The forms are lined with galvanized steel, which is oiled with a heavy oil before applying

the concrete. The resulting pipe has a surface of great smoothness. The 48-in. sections weigh about 5,500 lbs., the 36-in. about 4,325 lbs. and the 24-in. about 3,470 lbs., the quantities of concrete being 38, 32 and 23 cu. yds., respectively.

At the present time the pipe is being made at two points—at Hannibal for the Missouri district, and at Montgomery, Ill., near Aurora, for the Illinois and Iowa lines. At the former point the work is being done by company forces and at the latter by contract. The present cost per foot of the pipe laid is, approximately, \$3.25 for the 48-in., \$2.75 for the 36-in. and \$2.25 for the 24-in. As the cost of the corresponding sizes of cast-iron pipe laid is about \$10, \$6 and \$3.50, respectively, the great saving is obvious.

The designs were prepared under the direction of the Bridge Engineer, Mr. C. H. Cartlidge, to whom we are indebted for the data. These plans are regarded only as experimental and will be modified as occasion arises. Thus far none of the pipe in service has given indication of weakness of any sort.

#### Railroads in Belgium.

BY EMILE GUARINI.

Railroads in Belgium have an importance quite out of proportion to the limited area of the territory which they serve. The reason for this is that Belgium is highly developed industrially. Ownership of the railroads is, with the exception of a few branch lines, divided between the State, a few private companies and the Société Nationale des Chemins de Fer Vicinaux. The lines controlled by this latter company are railroads, so far as their construction and equipment are concerned, but they are really tramways, inasmuch as they have no signals and run along the public roads instead of on an enclosed right of way. These "vicinal" lines have been developed widely in Belgium. Strangely enough, in spite of the fact that they run on public roads without adequate protection, they have a lower average of accidents than the regular railroads.

The total length of the railroad mileage of Belgium is 4,431, of which the State controls 2,530 miles, private companies 367 miles, and 1,535 miles are vicinal lines. There are .384 miles of railroad for each square mile, on the average, of the country's area, this figure being much higher in the industrial provinces and much lower in the mountainous districts in the eastern part of the country and in the low-lying hilly regions. The profits of the State from operation of its lines are small. The total capital of the tramways is \$31,181,400 and the gross earnings per mile are from \$1,000 to \$10,400. Annual receipts are about \$2,500,000.

The vicinal lines enjoy numerous privileges. They are free from taxes and from postal duties, and their capital is, for the most part, furnished by the State, the provinces, and the communities through which they run. Of these lines, 80 are used for transportation of agricultural products, 174 for industrial products and one for military purposes. There are in service on these lines 470 locomotives, varying from 12 to 30 tons in weight. They have platforms in front and behind, with starting gear, brakes and warning signals at each end. The warning signals are horns, operated by small pneumatic hand pumps. The platforms are provided with glazed, movable frames, which protect the engineer from wind and dust. On these tramways all the staff, excepting the enginemen, co-operate in working the switches and in loading and unloading the freight.

On the State railroads freight trains must not be made up of more than 60 cars. In passenger service the average speed is about 38 miles an hour. Some of the express trains run at a rate of over 60 miles an hour.

The State railroads are all standard gage, but 1,511 miles of the other lines are narrow gage, mostly 3 ft. 3 in.; maximum gradients are 3 per cent. and maximums of curvature, 17 degrees. Rails on the more important lines are of the Vignoles section, weighing from 76 lbs. to 105 lbs. per yard. Of the State lines, 747 miles use the block system, though automatic signals are never used. The system most in use is that developed by an engineer named Flamache, which costs \$700 per post. At present Siemens & Halske electric signals are being installed at the large stations. There are large installations at the Antwerp, Brussels and Ghent terminals which are just about to be finished. The most powerful locomotives, of which 123 are now in use on the State lines, have eight drivers. Six coupled locomotives with 60-in. drivers have recently been introduced and are used chiefly for hauling ordinary passenger trains and express freight trains. The use of these engines in passenger service has done away with double heading in many cases. Careful experiments have shown that it is advantageous to use, in the average deep locomotive firebox, at places where it is specially difficult to haul trains, a new type of briquettes as an auxiliary fuel. By their use the production of steam is increased and the fire given greater stability on the grate. The price of these briquettes is nearly 50 per cent. higher than the small coal generally used, but trials have shown that it pays to use them on steep grades. Enginemen of engines which have deep fireboxes are provided with a stock of briquettes equal to 20 per cent. of the total coal consumption.

The passenger and freight cars in use in Belgium are of many kinds. Improvements have of late been made in the passenger cars on the State lines by the introduction of corridor cars. Each compartment has six windows fitted with spring blinds. The cars are heated by steam, and there is a regulator provided to enable passengers to regulate the heat. The cars are lighted by electricity, and each compartment has an alarm signal connected with the locomotive. The Stone system of electric lighting is widely used and found most satisfactory. In winter the ordinary cars are heated by hot water pans, or foot warmers, of which some 50,000 are in use. This method of heating is costly and unsatisfactory. Experiments were made last winter in heating a few of these cars with steam, but complaints were unanimous; the coaches nearest the engine were scarcely heated at all, while the others were entirely cold. Some of the less important trains are heated by portable stoves, and this while primitive, is as yet the most satisfactory method. Great care is taken to thoroughly disinfect all the cars and stations.

#### Rail-Motor-Car Traffic in England.\*

In this paper the authors propose to deal as far as possible with the question of rail motor cars, and it must be understood that they are seeking to give facts as to the best means of dealing with local and branch line passenger traffic, as being a commercial question as well as an engineering one. The best method of conveying passengers is clearly that one which yields the best results in the balance sheet, and at the same time gives satisfaction in other ways. The opinion held by most locomotive engineers, and by a large number of electrical engineers, on the broad and general question of railroad electrification, is that for dense suburban traffic only is it justifiable. It is suggested and maintained that the electrification of branch and main line traffic will, as a general rule, result in a loss to the railroad company, as the load-factor at the power station will be a very poor one, owing to the intermittent traffic. On the other hand, suburban traffic, especially if in thickly populated areas, calls for a more frequent service and a greater acceleration of speed than is attainable with ordinary passenger trains. It is not only desirable but is quickly becoming a necessity that, if the suburban railroad system is to hold its own with municipal tramway competition, a frequent service with high acceleration must be established in suburban districts. It was to meet this competition that one or two attempts were made to produce self-contained cars on various lines in the early part of the last century. While these cars were more or less a success, the requirements were not then great enough to encourage continuation.

It may not be out of place to mention here that in 1873 or 1874 a Mr. Rowan designed and built self-contained steam cars for which he could find no sale in England. His cars were, however, taken up to a certain extent abroad, notably, in Austria and Switzerland. In 1902, however, the competition of street cars in the suburban districts, especially around London, became more acute, and caused the railroad companies to give serious thought to the matter, and railroad motors were introduced by the London & South Western as an experiment. This proved so far successful that the Great Western and the Taff Vale Companies followed by building cars for trial upon their lines to fulfil the requirements of a more frequent service upon sections in certain districts where traffic was light. It was obviously impossible to run such a frequent service with ordinary trains as being too expensive, the running expenses and the capital outlay involved being too great in proportion to the passengers carried. It was then seen that the solution of the difficulty lay in self-contained cars, and the question of what motive power to use then arose; steam or electricity, and if electricity, which of the many methods of application would be employed.

The first company to move in the direction of self-contained car traffic was the London & South Western, which placed a steam car on its line between Fratton and Southsea in 1903. This car, which was equipped with small cylinders and a vertical boiler, was fairly successful, and encouraged the idea that progress in this direction promised a solution of the problem. Next, the Great Western adopted the four-wheel coupled type, the boiler being vertical and the engine being placed under the car. This car, which had to contend with heavier gradients than the car of the London & South Western, was necessarily more powerful.

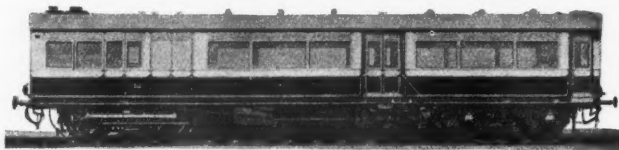
The Taff Vale Railway has a certain branch, which, owing to the paucity of passengers as a general rule, was not as profitable to work as was desired, and it was to this branch that attention was first drawn for any better and cheaper method of working. To be sure of getting the best results, careful comparisons were taken of the cost, both capital and running, of steam and electricity, the latter of which was subdivided as follows:

1. Self-contained cars, that is, worked with secondary batteries.
2. Third-rail system.
3. Overhead system; (a) with bonded rail return; (b) with new return rail.

\*From a paper presented at the Cardiff meeting of the Institute of Mechanical Engineers by Messrs. T. H. Riches and S. B. Haslam.

#### 4. With lead and return rails.

With a view to gaining experience in the methods obtaining abroad, one of the authors visited Belgium, France and Germany, and also collected information from all parts of the world where electricity was being used for rail traction, and the matter was thoroughly gone into. Various makers were asked to tender for the different classes of equipments, and the cost was carefully summarized. It was at once seen that the expenses of Sections 2, 3 and 4 were much too costly, the manufacturers and contractors, in fact, preferring not to quote for these, on account of this great



London & North Western Motor Car.

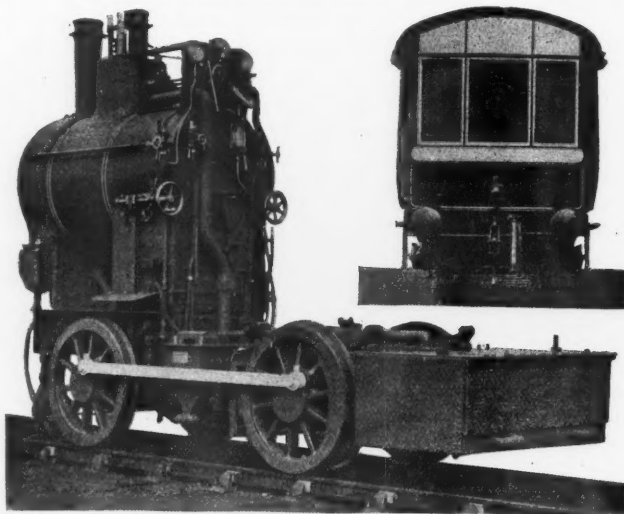
initial expense. The cost of a car with dynamo, driven by a petrol-engine with accumulators for working in parallel with the generator when necessary to overcome stiff gradients, was also considered. The outlay for this was, however, enormous, as the equipment, besides the above, also comprised a milking booster and two 75 h.p. motors, and caused the scheme to be abandoned.

The idea of a car run by current from secondary batteries was, however, given more consideration, and one of the authors visited Belgium and Swansea, and examined the cars used there, which at that time were run by storage batteries. The gross weight, without passengers, of each car was 100,800 lbs. and 43,260 lbs. respectively, and the seating accommodation was in Belgium 50 to 60, and at Swansea 42 inside, 57 outside. The capacity of the batteries was 140 ampère-hours, and the normal discharge rate 20 ampères at Swansea and 250 ampère-hours with discharge rate of 125 ampères in Belgium.

The general conclusion arrived at on the subject of battery cars was not favorable, as their first cost, namely, \$20,000—\$25,000, was high, and their maintenance was also excessive, while their weight and periods of inactivity when charging (a time equal to their period of activity) were all features which did not compare favorably with steam cars.

The results of the costs of the other sections are given in Table 1, and the running cost of an ordinary train is also given as a comparison, as well as the actual cost of the self-contained steam car.

These figures were based on the original design of the Taff



London & North Western Car.

Showing boiler in position on engine truck, also wheel on rear of car for working regulator when driven rear first.

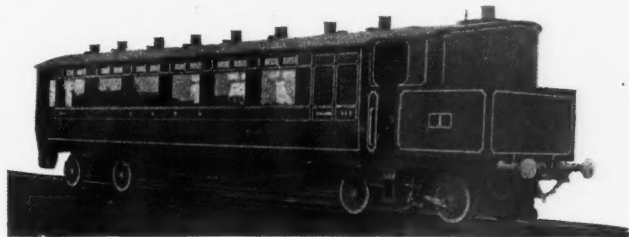
Vale Company's car to hold 52 passengers, their latest design holding 70. The conclusion drawn from these figures was, that unless the service is very frequent, that is, a train every few minutes, and the maximum distance from the power-house short, the steam service is better and more economical than the electrical. The question of taking current from a supply company in preference to installing generating plant was also thoroughly considered, and there is no doubt that when the amount of current or load factor fluctuates much, or where the power is originally small, the supply company can work at a considerably cheaper price per unit. Again, if the distance is great, that is, if the start and finish of that part of the line which is to be electrified are some way apart,



a considerable point in favor of the power supply is raised, as the current could be supplied at two or three points along the line, thereby doing away with and saving a considerable voltage drop and the resultant losses and the increased outlay. In the question of steam and electricity the subject of control has also to be considered.

It is worthy of remark that even those railroads which have gone in for the electric system have mechanical braking on their cars in preference to electrical, and it is generally held that the steam cars are, as a whole, more amenable to requirements and more easy to control. The usual system of braking on electrical railway cars is one or another of the ordinary air or vacuum brakes—the pump being driven by a small electric motor.

It was while these results were being arrived at that the London & South Western Railway Co. placed their steam car on the rails. The Taff Vale Railway Co. having satisfied themselves that the steam car was undoubtedly the most economical for their purpose, then designed and placed one on the rails, suitable for carrying the above-mentioned 52 passengers at a maximum speed of 25 miles per hour, and having a capacity of acceleration of 30 miles per hour in 32 seconds. This speed of 25 miles per hour, however, was found to be insufficient, and the greater speed, which had to be and was attained, caused at first some considerable trouble in axle-heating. Since then the journals of the driving wheels have been increased in length to 10½ in. instead of 7 in., and with other small alterations the car now attains a speed of 35 miles per hour



Car for Great Southern & Western (Ireland).  
Cylinders, 8½ in. x 12 in., 333 tubes, 1½ in. outside diameter.

with ease. The comparison of the weights, sizes and general details of the best known cars are given in Table 2.

The following points which cannot be tabulated are worthy of notice:

**Great Western Railway Car.**—The trailing pair of wheels of the motor bogie are the driving wheels and are coupled to the leading pair. The cylinders, which are fixed inside the frame, have balanced slide-valves, while the motion is of the Walschaerts type. The cars are lighted by means of 20-c.p. incandescent-gas lamps, the gas being stored in cylinders attached to the underframe. Hand and vacuum brakes are fitted to each bogie, and can be operated from either end of the vehicle, while electrical communication is provided between the motor and driver's compartments. The water tank, which holds about 450 gallons, that is, sufficient to take the car 30 miles, including stops, is attached to the underframe. The main frame of the coach body runs the whole length of the car and includes the engine and boiler.

**Taff Vale Railway Car.**—As previously mentioned, the leading pair of wheels are the driving wheels, the cylinder being fixed between the leading and trailing pairs outside the frame. The valves are operated by an ordinary link motion with rocking shaft. The compartments are heated by steam from the engine with warmers of acetate of soda, and the lighting is done by Pintsch's system of oil gas. Steam and hand-brakes are provided on the motor bogie, while there is a hand-brake in the car bogie, the latest type being also fitted with vacuum brakes. The conductor can communicate with the motorman by means of an electric bell, and also shut off steam and sound the whistle. The motor is capable of traveling at 35 miles per hour on the level, and can ascend a gradient of 1 in 40 at a speed of 20 miles per hour. This car can be driven from either end, and all operations except starting can be performed from the guard's compartment. A distinct feature of the car is the ease with which the engine can be taken from the coach body, 20 minutes being ample time for this work, while it can be put under in the same time.

**Great North of Scotland Railway Car.**—In this car again the leading pair of wheels of the motor bogie are the driving wheels, the cylinders being fixed outside the frame between them and the trailing pair. The slide-valves are placed above the cylinders and are actuated by means of the Walschaerts gear. The cars are lit by Stone's system of electric lighting, the current being generated by a dynamo suspended from the carriage underframe and driven from one of the axles. The water tank is also suspended from the underframe and holds 660 gallons. Provision is made for driving the car from either end, and for this purpose the vestibule is fitted with a steam regulator, whistle-handles and Westinghouse and hand-brakes. There is also fitted Chadburn's telegraph apparatus,

which indicates the various notches backwards and forwards at which the driver wishes the gear to work.

**Great Central Railway Car.**—Both vacuum automatic and hand-brakes are used, and, together with the steam regulator and whistles, can be governed by the driver from either end, while there is electrical communication between driver and conductor. The passenger compartments are heated by steam from the engine, and the car is lit throughout by electricity, the dynamo and accumulator being suspended from the underframes, the former being driven by a belt from one of the axles. The water storage is also under the frame.

**London & North Western Railway Car.**—In this car the cylinders are carried inside the frame of the motor truck, while the water tank, which has a capacity of 455 gallons, is carried under the carriage body, but attached to the engine truck. The engine can be worked from either end of the car, which is fitted with automatic vacuum and hand-brakes, and is lighted throughout with electricity on Stone's system.

**South Eastern & Chatham Railway Car.**—The cylinders of this car are carried outside the frame placed horizontally with the valves on the top, the latter being operated by means of the Walschaerts gear. Water to the amount of 400 gallons is carried in three tanks, one on each side of the boiler with a well tank between the frames. Vacuum automatic and hand-brakes are provided. The guard's compartment is fitted with levers for working the reversing gear, regulator, whistles and hand-brake, while electrical communication is provided between each end of the car. The carriage is fitted with Stone's system of electric lighting, the dynamo accumulators being carried underneath the frame.

**Great Southern & Western Railway Company of Ireland Car.**—In this design the leading pair of wheels of the motor truck are the driving wheels, the cylinders, which are outside the frame, being slightly out of the horizontal. The valves are operated by means of the Walschaerts gear. Steam can be shut off from either end of the coach, while electrical communication is provided between front and rear portion. The average speed of this car is 20 to 21 miles per hour.

**Canadian Pacific Car.**—The car is to be operated by steam generated by fuel oil, while the boiler is a return-tube boiler with a superheater fitted in the back end of the boiler. The cars have single driving wheels and their valves, which are of the piston type, are operated by the Walschaerts valve-gear. Acetylene gas is used for the lighting purposes. The oil is consumed in a circular Morison furnace, 32 in. inside diameter by 5 ft. 6 in. long.

**Great Northern (Ireland) Car.**—The cars built by this company have cylinders fixed horizontally outside the frame, between the wheels, driving to the trailing pair which are coupled to the leading pair. The valves, which are on the top, are operated by the Walschaerts type gear. The cars are fitted with an automatic vacuum-brake operated from either end of the car, while there is a hand-brake on the car itself. The cars are all heated by steam and lit electrically on Stone's system. Electrical communication and speaking tubes are provided between the driver's and guard's compartments.

**North-Eastern Car.**—This company, while having no steam motor cars, has a number of engine and coach combinations performing practically the same service, as the engine can be driven from the front end of the coach when running behind it. A driver's compartment is forward in the rear end of the coach and fitted with a wheel for the reversing gear, a lever for the steam regulator, an air-brake valve, a hand-brake and a whistle worked from the air-brake reservoir. The driver has therefore complete control of the locomotive, with the exception of the cylinder drain cocks and sanding gear, which are worked as required by the fireman. The reversing gear is worked by the hand-wheel keyed to a shaft which carries a sprocket wheel gearing with a longitudinal shaft by a chain. This shaft extends the whole length of the coach and gears to the screw of the reversing gear by means of an intermediate shaft and chain. A three-jaw clutch is interposed to disconnect the operating gear when it is desired to work the locomotive from the footboard.

This railroad company has also an electrical car running between Scarborough and Filey, which is operated in a somewhat novel way. A storage battery of 38 cells is suspended between the frames and supplies current to the generator, which is used as a motor to start up the petrol engine. After the engine has been started, the current is switched off and the motor takes its proper place as a generator. A small exciter is used both to excite the main generator which drives it and to supply the lighting current for thirty 72-volt, 16-c.p. lamps. The voltage of this machine can be increased to 95 volts for charging the battery when not required for lighting.

**Missouri Pacific Car.**—This company is now building a car which is being manufactured by the St. Louis Car Co., the special feature of which is the engine, which is being manufactured under the Wagenhals patents. The engine is the double-cylinder actuated by the Stephenson link-motion. The frame of the engine will be secured to the rear of the frame of the truck, and the forward end

of the engine-frame will be secured in journal-bearings on the axle. The crank-disc will be located on a jack-shaft carrying a gear which will mesh into a gear on the axle of one pair of wheels. Steam is generated with oil fuel, of which the car will carry 1,000 gallons, and the engine will develop 275 h.p.

**Port Talbot Car.**—The car being built to the order of the Port Talbot Docks & Railway Co. is well worthy of mention, and presents many novel features. The motor truck is a six-wheels-

able to. The rapid rate of acceleration makes the through speed higher. The experience of those railroads who have given both an extensive trial is that the system is equally advantageous for heavy and sparse traffic. In the first case the motors sandwiched in between the regular trains find a traffic without taking it away from the trains, while in the second the traffic has been developed by the more frequent service. The number of steam cars at present running, and the ever-increasing number both at home and abroad,

TABLE I.—Comparative Costs.

Details.	Cost of original system. Small engine and train. 1/2 engine per day.....	Secondary battery.		Third-rail system from Supply Co. Car.....\$6,561 Preparing 6 mls of rls34,681	Steam cars. Car....\$10,206
		Own power supply. Car complete\$19,440 Generating station....	From Supply Co. (at 2c. per unit.) Car.....\$19,440 Transformers.....		
I.—Single car: Capital cost .....	\$3,562 \$8,626	5,589	486		
Interest at 4 per cent .....	\$12,188	\$25,029	\$19,926	\$41,242	
Maintenance, wages, etc. ....	\$486 4,788	\$1,001 3,480	\$797 2,634	\$1,648 3,305	\$408 1,220
Total .....	\$3,224	\$4,481	\$3,431	\$4,953	\$1,628
At 11,000 miles per annum, cost per mile	47.37c.	40.44c.	31.11c.	44.66c.	15.63c.
II.—Two cars: Cost per mile .....		39.59c.	30.91c.	32.93c.	
III.—Three cars: Cost per mile .....		39.18c.	30.70c.	28.48c.	

TABLE 2.—Comparison of Details of Various Steam Cars.

Railroad.	Number of passengers 1st. 3d.	Length over all. ft. in.	Size of cylinders. Diam., Strk. in. in.	Weight on trucks in tons. Motor, Trail g. tons. tons.	Grate area, sq. ft.	Total heat-ing of motor surface, sq. ft.	Diameter of wheels, ft. in.	Water capacity, gals.	Trac-tive force, in lbs.	Boiler details.
G. W. Ry. ....	61	70 0	12 16	26.9 16.25	11.54	659.24	4 0	450	6,912	Vertical 4 ft. 6 in. diameter with cone top—160 lbs. pressure. 458 tubes 1 1/2-in. diameter.
T. V. Ry. (old type) ....	12 40	58 8	9 14	25.0 10.85	8.0	338.5	2 10	550	4,269.2	Two barrels with 152 1 1/2-in. di- ameter tubes and smokebox each. 160 lbs. pressure.
T. V. Ry. (new type) ....	16 57	70 3 3/4	10 1 1/2 14	30.7 11.25	10.0	464.84	3 6 (driving) 2 10 (trailing)	550	5,292	Two barrels with 232 1 1/2-in. di- ameter tubes and smokebox each. 180 lbs. pressure.
G. N. Ry. of Scotland ...	46	50 0	10 16	40	9.0	500.0	3 7	660	4,465	Vertical multitubular type. 150 lbs. pressure.
G. C. Ry. ....	16 34	61 6	12 16	29.75 14.8	13.0	610.36	3 9	550	7,680	Vertical boiler. 150 lbs. pressure.
L. N. W. Ry. ....	48	57 0	9 1/2 15	27.4 16.0	6.38	317.27	3 9	455	4,210	Loco. type. 175 lbs. pressure.
S. E. & C. Ry. ....	56	64 11 1/2 (over buffers)	10 15	24.5 14.0	8.8	381.5	3 7	400	4,480	Loco. type. Belpaire firebox. 160 lbs. pressure.
G. S. & W. Ry. of Ireland	6 48	50 0	8 1/2 12	12.2 20.3	8.4	367.66	2 9	430	2,360	Loco. type. 309 1 1/2-in. outside diameter tubes. 130 lbs. pres- sure.
Canadian Pacific Ry. ....	52	72 0 (car frame)	10 15	58-62	.....	600.0 (about)	3 6	750	2,500	Return tubes boiler. 160 lbs. pressure.
G. N. Ry. of Ireland ....	20 39	61 6	12 16	25.5 15.0	11.5	653.1	3 9	550	6,720	Vertical multitubular. 420 1 1/2- in. outside diameter tubes. 175 lbs. pressure.
Missouri Pacific ....	64	78 0	11 12	58	.....	.....	3 6	2,000	6,966	Water-tube. 250 lbs. pressure.
Port Talbot ....	61	77 4 (buffers)	12 16	.....	13.1	660.0	3 0	600	8,700	Loco. type. 170 lbs. pressure.
G. N. Ry. ....	53	65 8 3/4 (buffers)	10 16	27.3 15.15	9.5	382.0	3 8	560	5,120	Loco. type. 175 lbs. pressure.
L. & S.W. (last type car)	40	50 0	10 14	21.7 10.6	6.75	347.0	3 0	485	3,889	Loco. type. Firebox fitted with water-tubes.
Glasgow & S. W. Ry. ....	..	57 0	9 15	.....	.....	.....	3 6	...	.....	Loco. type. 142 tubes 1 1/2-in. outside diameter.
L. B. & S. C. Ry. ....	48	57 3 (buffers)	8 1/2 14	22.05 12.075	7.0	369.0	3 8	450	3,230	Loco. type. 242 tubes 1 1/2-in. out- side diameter.
L. & Y. Ry. (new cars) ..	48	66 5	12 16	32.75	9.4	509.0	3 7 1/2	550	7,530	Loco. type. 4 ft. 3 in. diameter barrel, 199 1 1/2-in. outside diam- eter tubes. 180 lbs. pressure.
N. Staffs. Ry. ....	46	50 5 (buffers)	8 1/2 14	20.875 11.675	7.0	368.0	3 8	450	3,305	Loco. type. 180 lbs. pressure.

NOTE.—L. & Y. Ry. made their first two cars to the Taff Vale Railway Company's specification.

coupled type, with 3-ft. wheels, the valves being operated by an adaptation of the Walschaerts gear. The car is lit by electricity generated by a steam turbine-driven dynamo. The gradient this car has to work is extremely stiff—three miles of 1 in 40.

It is a fact worthy of remark that, while the Metropolitan, North Eastern, and Liverpool & Southport are the only English electric lines to make use of high-tension transmission, all the foreign ones do so with the exception of the Boston Elevated and Grenoble-Chapriellan. The Isle of Man electric tramways, while perhaps not coming under the description of an electric railway, may be mentioned here, owing to the fact that they transmit the power at 6,000 volts.

Again, the foreign railroads are the only ones up to the present, with the exception of the Metropolitan, who have made use of the turbine to provide the motive power to the dynamo. In the case of the Grenoble-Chapriellan, this motor power is supplied by a waterfall 1,476 ft. high, and is distributed to the turbines from a collector placed outside the station.

The Valtellina Electric Railway also derives its motive power from water. In this case the water is taken from the River Adda, and has a flow of 550,000 cu. ft., with a maximum head of 90 ft., and is sufficient to develop 7,500 h.p.

**Advantages.**—The advantages of the rail-motor system of carrying passengers may be placed as follows: Owing to the small unit, a much more frequent service is given with a better percentage of freight to dead weight hauled, while the mileage cost of working is only about one-third the cost of an ordinary passenger train-mile. The facility of picking up and setting down passengers at line crossings, small villages, etc., makes the service more popular, and enables many passengers to travel who would not otherwise be

proves their utility, and it seems certain that in them railroads have the best, and in fact only, effective answer to street car competition.

TABLE 3.—Details of Electric Traction on the Lines Shown Below.

Railroad.	Gross power in k.-w.	Pressure in volts		Gross power capacity of each train, H.P.	No. of passen-ger seats per train.	Ruling gradient.
		Gener-ated.	Used in motors.			
Liverpool & Southport.	6,750	1,500*	600†	1,200	270	1 in 85‡
Gt. Northern & City...	3,200	500†	500†	500	50	1 in 30
Mersey .....	4,650	650†	650†	400	Av'g. 60	1 in 30
				(single)		maximum 1 in 27
Liverpool Overhead ..	5,400	500†	500†	400	160	1 in 200
Metropolitan .....	14,000	11,000*	550†	1,200	322	1 in 44*
North Eastern .....	11,200	6,000*	600†	600	186	1 in 27a
Liverpool & Manchester	6,000	10,000*	550†	560	35	...
Central London .....	.....	500	500	.....	336	...
Metropolitan District..	4,000	550	550	1,600	312	1 in 43
City & Waterloo .....	1,200	525†	500†	160(s)	50	1 in 30§
				320(d)	204	...
Boston Elevated .....	36,844	550	550	1,200	192	1 in 20
Paris Metropolitan ...	6,000	5,000*	600†	200	60 per car.	1 in 3.6
				300		
Paris-Orleans .....	2,060	5,500*	350†	668	525	1 in 100
Grenoble-Chapriellan ..	750	600†	600†	70	36 per car.	...
Lecco-Sondrio (Ganz) ..	4,476	20,000*	3,000†	600	56 per car.	...
Valtellina Electric .....	6,000	20,000*	3,000†	600	170	1 in 50
Burgdorf-Thun .....	3,720	4,000*	750†	240	136	1 in 40

REMARKS: Mersey—Secondary batteries are utilized in the generating station for taking peak loads; Liverpool Overhead—Above remarks apply; Liverpool & Manchester—Proposed mono-rail; Grenoble-Chapriellan—Water turbines; Lecco-Sondrio (Ganz)—Steam turbines; Valtellina Electric—Water turbines; Burgdorf-Thun—Steam turbines.

\*Three-phase. †Direct-current. ‡For a short distance. \*For about 14 1/2 chains. §For a distance of 900 ft. a 1 in 27 (goods line), 1 in 50 (passenger line).



### Railroad Building in Canada.

In Canada there are between 5,000 and 6,000 miles of new railroad now actually building, including the Grand Trunk Pacific, which will require the expenditure of approximately \$100,000,000. The main divisions of the work are as follows: Canadian Pacific, 1,270 miles; Canadian Northern, 1,567 miles; Grand Trunk Pacific, 1,900 miles; Hill roads, 1,000 miles. In addition to these, the Minister of Railways has had no less than 43 resolutions in respect to subsidies which were voted during the last session of Parliament. They call for subventions ranging from \$3,200 per mile to \$15,000 per mile to assist in building 43 different lines of railroad covering 2,885 miles, and they total about \$9,399,900, divided up among the provinces as follows: Quebec, \$3,574,100; Ontario, \$2,925,000; Maritime Provinces, \$1,697,600; Western Canada, \$1,203,200. At the extremes of this aid by the state may be noted a subsidy of \$25 for the shortest line—nine miles—from Aylmer to Hull, Quebec, and one of \$1,158,400 for the longest line, from Edmonton and Paspehere to Gaspe. The projected lines average 67 miles long.

Such remarkable activity in railroad construction and development as is now going on throughout the Dominion has never before been equalled or even approached. This is certainly Canada's year, so far as railroad building goes, and there are no signs of a let up. Contracts on the Grand Trunk Pacific are still being let as fast as bids can be received and tabulated. The Grand Trunk Pacific branch lines bill has been before the House of Commons for some time, and so amended that 22 branch lines must begin within two years and finished in ten, involving the building of over 5,000 miles of branches. Contracts for material for this work are already being awarded, and bids aggregating 68,000 tons of steel rails are now in the hands of the Railway Commission. The "Soo" rolling mills and the Dominion Iron & Steel Co., of Sydney, have each been awarded a contract of 32,500 tons of steel.

The new line from Quebec to La Tuque, on the National Transcontinental, for which MacDonald & O'Brien have the general contract, is being rushed under eight sub-contractors. The Canadian Pacific is also pushing work on a formidable lot of extensions, as it has done for several years past. Under the name of the Kettle River Railway, a line is being built from Grand Forks, B. C., to the McKinley mines, about 50 miles. This is all difficult mountain work, and has been awarded at \$25,000 a mile, a total of \$1,250,000. Surveys are now being made through Kicking Horse Pass, north of the present route of the C. P. R. Rights of way and capital are both said to have been secured, and it is expected that contracts for the work will be let very soon. The British Columbia Contract Co. has a contract for grading and clearing the right-of-way on the new Strassburg extension from Strassburg to Saskatoon, 112 miles, and the line from Winnipeg to Molson, 25 miles, is being built. On the Canadian Northern a line 80 miles long, east from Port Arthur, is under way, and a contract was made last June for 95 miles of road from Oakland to Makinok. The Ontario government has granted the Canada Central Railway a subvention of \$5,000 per mile for 53 miles of line from Little Current to a point near Sudbury, Ont., and contracts will be let at once.

The Revillon Company, a competitor of the Hudson Bay Company, has been given several franchises this session from the government, and will let contracts at once for building 1,000 miles of railroad from Quebec northwest into the fur trading country. The company has \$5,000,000 capital.

The Ontario government has given a \$3,000,000 subvention to the Bruce Mines & Algoma, and a 25-mile line will be built to open up the Bruce Company copper district. A charter for the Kamloops & Yellowhead, a branch of the Canadian Pacific, has recently been granted and contracts are to be let at once for a line 250 miles long from Kamloops to Seke Junne Cache, B. C. Smith & Johnston, attorneys of Victoria, B. C., are applying to the legislature of British Columbia for a charter for the Fording Valley Railway, which proposes to build a line from a point on the British Columbia Southern through Elk River to the Alberta boundary, and thence to Okatoka and Smith via Grace and Levis, 107 miles. Contracts have been let to Rhodes, Curry Co., of Amherst, N. S., for building a 110-mile extension of the Temiskaming & Northern Ontario from New Liskeard to Temiskaming, in the Cobalt silver region.

No general charter has been granted to the Hill interests for the proposed line from Winnipeg to the coast, but several charters obtained during the last session of the Dominion Parliament are known to be "Hill charters." Mr. Hill expects to purchase lateral lines, starting from different points in the three western provinces, and will join them to the main line of the Great Northern. Such lines, many eastern people think, will direct the traffic of the west to United States ports, and will deprive the ports of Montreal, Quebec, Halifax and St. John of the trade from the west. Already Mr. Hill has 11 branches to the international boundary, beginning on the west at Summerson, Man. He also has a branch line into Lethbridge from Shelby on the Great Northern via Sweetgrass, Montana, and another into Fernie, B. C. His intention, so far as can be learned, is to build from Fernie via Medicine Hat

to Winnipeg; from Fernie via Calgary to Edmonton; from Edmonton to Medicine Hat and across the international boundary to the Great Northern at Harre, Mont.; from Lethbridge an extension to Calgary; from Edmonton to Regina, thence to Sherwood, joining the G. N. line at the boundary; from Regina to Prince Albert, touching some point east of Saskatoon; from the Antler line of the G. N., to Melita, Man.; from the St. John (Dakota)-Brandon extension to the north, hugging the boundary line of Saskatchewan and Manitoba to the Saskatchewan river; from Gretna, Man., parallel with the international boundary, crossing the St. John-Brandon line to the Saskatchewan-Manitoba boundary; from the Gretna-Portage La Prairie extension to Lake Winnipegosis; from Winnipeg northeast to the country east of Lake Winnipeg.

### Single Phase Equipment for the Washington, Baltimore & Annapolis Railway.

The announcement that the Washington, Baltimore & Annapolis Railway has finally adopted the single-phase system and has let contracts for the entire electrical equipment required for this line will attract considerable interest in engineering and railroad circles, not only on account of the fact that this is one of the most important orders yet given for alternating current equipment in this country, but also because the original promoters of this line were the first to adopt the single-phase system.

Some three years ago contracts were let for the construction of this line, but due to financial difficulties the road was never built. In the former plans for single-phase equipment between Baltimore and Washington it was proposed to use a trolley potential of 1,000 volts, current being delivered at this voltage at a frequency of 16½ cycles per second. The present contract calls for a trolley potential of 6,600 volts at a frequency of 25 cycles per second. On the cars a four-motor equipment was proposed, each motor having a capacity of 100 h.p. The new car equipment will consist of quadruple GEA-603 motor equipments for direct or alternating currents, each motor having a capacity of 125 h.p. While the first proposed motor equipments would have driven the cars at about 40 miles per hour, the new equipments, totaling 500 h.p., will enable express trains on the road to attain a speed on tangent level track of 60 m.p.h.

The details of the new road have been carefully worked out by the Roberts & Abbot Engineering Company, of Cleveland, Ohio. Single-phase equipment was chosen only after a careful study had made it apparent that this system would prove most economical and best adapted to meet the special service conditions existing on this road.

About 60 miles of road will be operated by the new company. The main line will be constructed between Baltimore and Washington, with a branch line from a point on the main line near Odenton, extending to Annapolis. This station on the new line will be known as Academy Junction. Over the main line between Baltimore and Washington an express and local service will be established, express cars being operated under a 15 minute headway and making the run in 72 minutes. The road will be double-track, with sidings so arranged that the locals may be side-tracked to enable the expresses to maintain schedules. Nineteen express cars, capable of making 60 m.p.h. on a tangent level track will be operated. In addition two work-cars will be equipped, each sufficiently powerful to haul a train of five ordinary passenger coaches at 45 m.p.h., while four lower powered cars will be used for local service. These last mentioned cars will run at a speed of 45 m.p.h. The express and work-cars will each be equipped with four GEA-603 (125 h.p. each), A.C.-D.C. motor equipments with the Sprague-General Electric type "M" train control. The local cars will be similarly controlled, but will be driven by two instead of four GEA-603 motors.

Power for the new road will be bought from the Potomac Electric Company at Washington, D. C., and will be delivered by that company at 6,600 volts three-phase to a transformer sub-station located about three miles from Chesapeake Junction. In order to obtain a balanced load on the three-phase generators, the current as received at the sub-station will be changed from three-phase to two-phase by groups of two transformers connected three-phase on the 6,600-volt primary side and two-phase on the secondary side. Half of the transformers will have the secondaries wound for 6,600 volts and the other half for 33,000 volts. The 6,600-volt windings will all be connected in parallel on the same phase supplying single-phase current to the trolley as far as Academy Junction. The 33,000-volt secondary windings will all be connected in multiple on the second phase to the 33,000 volts transmission line, which will supply current to a step-down sub-station located at Academy Junction. The Chesapeake Junction sub-station will contain seven 800-k.w. water-cooled transformers, three with 33,000-volt secondaries, and four with 6,600-volt secondaries, one of the latter transformers forming a reserve.

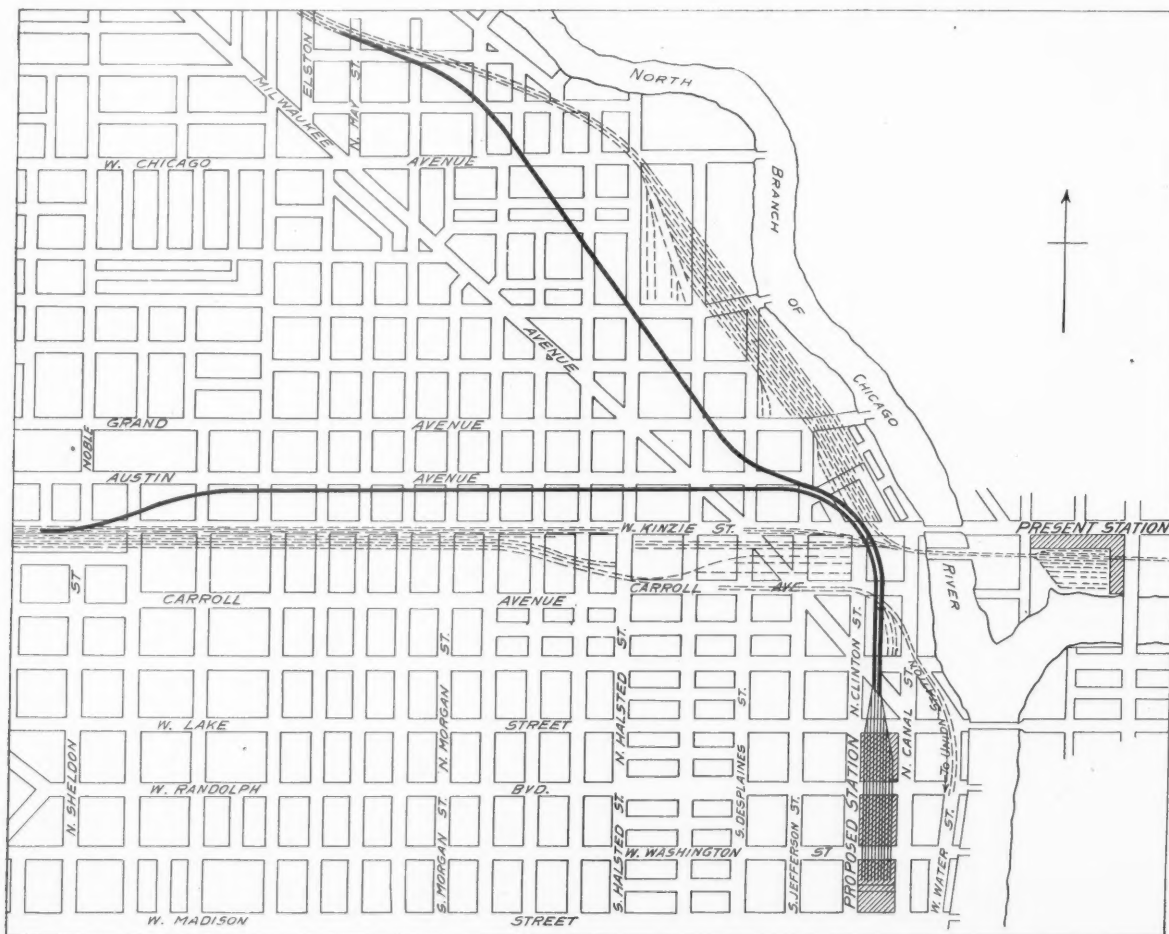
At Academy Junction there will be four-water cooled transformers, 25 cycle, 800 k.w., reducing the single-phase 33,000-volt

current of the transmission line to 6,600 volt current suitable for delivery to the cars. These transformers will supply the Baltimore and the Annapolis sections of the line.

The sub-station at Academy Junction will be located adjacent to the car barns. For greater safety in inspecting and handling the cars, all of the trolley circuits in the car barn will be arranged for 600-volt direct-current, and for this purpose two 300-k.w. motor generator sets will be installed in the transformer sub-station, changing the 6,600-volt alternating-current to 600 volts direct-current. The motor end of these motor generator sets will be connected direct to the trolley circuits, one phase being led from the trolley coming from Chesapeake Junction and the other from the Academy Junction transformers. A feeder regulator will be placed in one phase so that the motor generator sets will act as balancers, permitting the Academy Junction transformers connected on phase "B" to feed into the trolley line supplied by the Chesapeake Junction transformers on phase "A." In addition to acting as balancers and to supplying current to the cars in the barns, the motor gen-

#### Chicago & North-Western New Passenger Terminal in Chicago.

The Chicago & North-Western is to build a new passenger terminal in Chicago on an entirely new site, according to an announcement to that effect made on Oct. 8 by Vice-President W. A. Gardner. The new terminal is to be located not far from the present terminal, but on the opposite side of the river, as the accompanying map shows. The chief restricting feature in the movement of trains in and out of the present terminal is the river crossing, which is a double-track drawbridge. The road's heavy suburban traffic as well as all through trains, amounting to more than 300 trains daily, must cross this bridge. Furthermore, the present site is limited for track room, with no space to expand. The new terminal will be free of these hampering conditions, and there will be a freedom of access, both by passengers and trains, quite unknown with the present facilities. The approach to the old terminal from the business center of Chicago is over a single drawbridge which is frequently opened and closed.



Location of New Chicago & North-Western Passenger Station in Chicago.

erator sets will also supply direct-current to the motors in the repair shops located at this point.

Government regulations within the District of Columbia prohibit the use of the track return so that within this section the cars will be operated with a double trolley. This portion of the tracks, as well as that within the city of Baltimore, is at present operated by direct current, and the new cars are designed to operate on direct current over these sections of the line.

The present Washington, Baltimore & Annapolis Railway Company which is constructing the line is quite distinct from the initial corporation. The new company, under the head of its President, Mr. Geo. C. Bishop, has considerably broadened the former plans. Land has been purchased for a wider right-of-way along the route, and new bridges are being built so that the roadbed will be excellent. The engineering work is in charge of the Roberts & Abbot Engineering Company, of Cleveland, Ohio, and contracts have been placed with the General Electric Company for the complete electrical equipment. The construction and operation of this road will be watched with interest, as it is one of the largest and most important installations of the single-phase railway system ever undertaken.

For a number of years Mr. Marvin Hughitt, President of the North-Western, has given his attention to the solution of the road's terminal problem in Chicago, and a year ago he associated with him as consulting engineer Mr. John F. Wallace, formerly Chief Engineer of the Panama Canal and now President of the Electric Properties Co., New York. Together, they have worked out a satisfactory solution of the problem.

The new station site fronts on West Madison street. It lies between Canal and Clinton streets and extends north to Lake street. This section is one of the oldest in the city and is, of course, solidly built up. Over \$2,000,000, it is said, has already been expended in buying the property on which the station is to stand and in the purchase of other land for right-of-way. Considerable more property is still to be acquired, the estimates on the total outlay which probably will be required for this purpose reaching as high as \$7,500,000. The plans for the station are at present in course of preparation, so that only its most general features can be outlined. As already mentioned, it will front on Madison street, occupying a city block in width, and will extend north across two streets—Washington and Randolph—to Lake street. The plans contemplate no change of grade in these two intervening streets. Instead, the



station is to be elevated and will span both, and street traffic will pass through tunnels a block long. There will be six street level entrances to the station—one from Madison, two each from Washington and Randolph, and one from Lake street. The general waiting room will be on the second floor on a level with the elevated tracks, of which there will be 16 in the station.

The terminal plans will provide for complete separation of passenger and freight traffic. Two new routes of three tracks each will lead from the north end of the station. At Jefferson street and Austin avenue these routes will diverge, one running in a north-westerly direction and joining the main line at Cornell and May streets, and the other running directly west along Austin avenue to the main line at Ada street. The northwesterly route will be devoted exclusively to passenger trains on the Milwaukee and the Wisconsin divisions. The westerly route will carry passenger trains from the Galena division, the Omaha line.

The present tracks, which these routes will parallel, will be given over entirely to freight traffic, and the Wells street station will be used as a freight depot exclusively. On each of the two new routes the through traffic will be conducted separately from the suburban service. The new station will have a capacity of several trains a minute, whereas the present station can handle only one train every two minutes. In area the new station will be larger than the La Salle street station, the Lake Shore-Rock Island Chicago passenger terminal, and the capacity for business is expected to equal the facilities of the Boston South station.

Work is to begin on the new terminal in the spring, and it is expected that a year and a half at least will be required to complete it, or that it will be in operation within two years from the present time. The total estimated cost is reported to be between \$15,000,000 and \$20,000,000, which includes the revision of the entire terminal facilities as above outlined. Mr. E. C. Carter, Chief Engineer of the Chicago & North-Western, will have charge of the work.

#### Increases in Railroad Earnings in August.

The *Wall Street Journal* has compiled a striking list of the increases in August earnings of 44 railroad companies which have so far given out their figures for this period. In the following table the gross earnings of each road have increased as much as, or more than, the figures given:

Atchison, Topeka & Santa Fe .....	\$1,000,000
Baltimore & Ohio .....	700,000
Canadian Pacific .....	1,000,000
Chicago & North-Western .....	600,000
Chicago, Rock Island & Pacific .....	500,000
Illinois Central .....	400,000
Lake Shore & Michigan Southern .....	300,000
Lehigh Valley .....	400,000
Louisville & Nashville .....	600,000
New York Central & Hudson River .....	400,000
Pennsylvania .....	1,000,000
St. Louis & San Francisco .....	400,000
Southern .....	300,000

#### Increases of less than \$50,000:

Iowa Central.	Philadelphia & Reading.
Lake Erie & Western.	Wisconsin Central.
Minneapolis & St. Louis.	

The only road reporting smaller gross earnings than in August of last year was the Buffalo, Rochester & Pittsburg, whose earnings decreased about \$62,000.

The net earnings of the same roads do not show so many increases as the gross earnings. It is natural that at this time of the year larger amounts should be spent in maintenance. The following tables show the increases in net earnings:

Atchison, Topeka & Santa Fe .....	\$700,000
Baltimore & Ohio .....	200,000
Canadian Pacific .....	600,000
Chicago, Rock Island & Pacific .....	300,000
Lehigh Valley .....	200,000
Pennsylvania .....	300,000

#### Increases of more than \$100,000 are reported by the following:

Chicago & Alton.	St. Louis & San Francisco.
Kansas City Southern.	St. Louis Southwestern.
Louisville & Nashville.	Yazoo & Mississippi Valley.

#### Increases of \$50,000, or more:

Canadian Northern.	Philadelphia, Baltimore & Washington.
Central of New Jersey.	Pittsburg, Cincinnati, Chicago & St. Louis.
Mobile & Ohio.	Toledo & Ohio Central.
N. Y., Ont. & Westn.	Wheeling & Lake Erie.

#### Increases of less than \$50,000:

Alabama Great Southern.	Illinois Central.
Buffalo & Susquehanna.	Iowa Central.
Chicago Great Western.	Minneapolis & St. Louis.
Chesapeake & Ohio.	Norfolk & Western.
Colorado & Southern.	Northern Central.
Duluth, South Shore & Atlantic.	Texas Central.
Gulf & Ship Canal.	West Jersey & Sea Shore.
Hocking Valley.	Wisconsin Central.

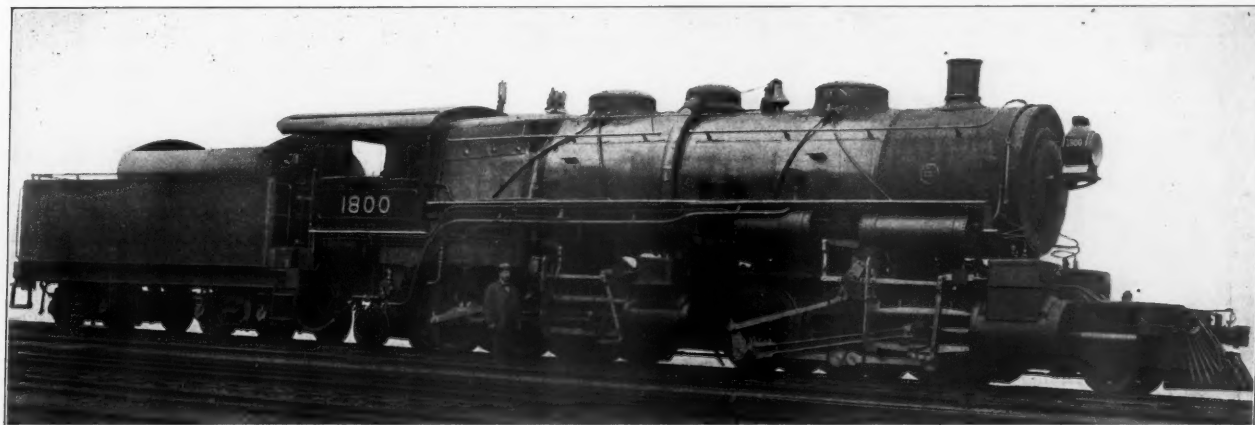
The net earnings of the Southern decreased \$171,410; of the Erie \$101,000, and of the Philadelphia & Reading \$95,948. The other roads reporting decreases, all of them being comparatively slight, are the following:

Atlantic Coast Line.	Georgia Southern & Florida.
Buffalo, Rochester & Pittsburg.	Kanawha & Michigan.
Central of Georgia.	Nashville, Chattanooga & Western.
Cincinnati, N. Orleans & ex. Pac.	Rio Grande Southern.
Georgia Railroad.	Toledo, Peoria & Western.

#### Mallet Compound Locomotive for the Great Northern.

In the *Railroad Gazette* of August 17 a short description, with a photograph, was published of a new Mallet compound locomotive built by the Baldwin Locomotive Works for the Great Northern. Through the courtesy of the builders a further description of this engine with engravings of its more important features in detail is given herewith. Five engines of this type have recently been built for the Great Northern.

The Mallet compound built for the Baltimore & Ohio attracted



Mallet Articulated Compound Locomotive. Built by the Baldwin Locomotive Works for the Great Northern.

#### The following roads also report increases of \$200,000 or more:

Atlantic Coast Line.	Cleveland, Cincinnati, Chicago & St. Louis.
Canadian Northern.	Pittsburg, Cincinnati, Chicago & St. Louis.
Central of New Jersey.	Yazoo & Mississippi Valley.
Chesapeake & Ohio.	

#### Increases of \$100,000, or more:

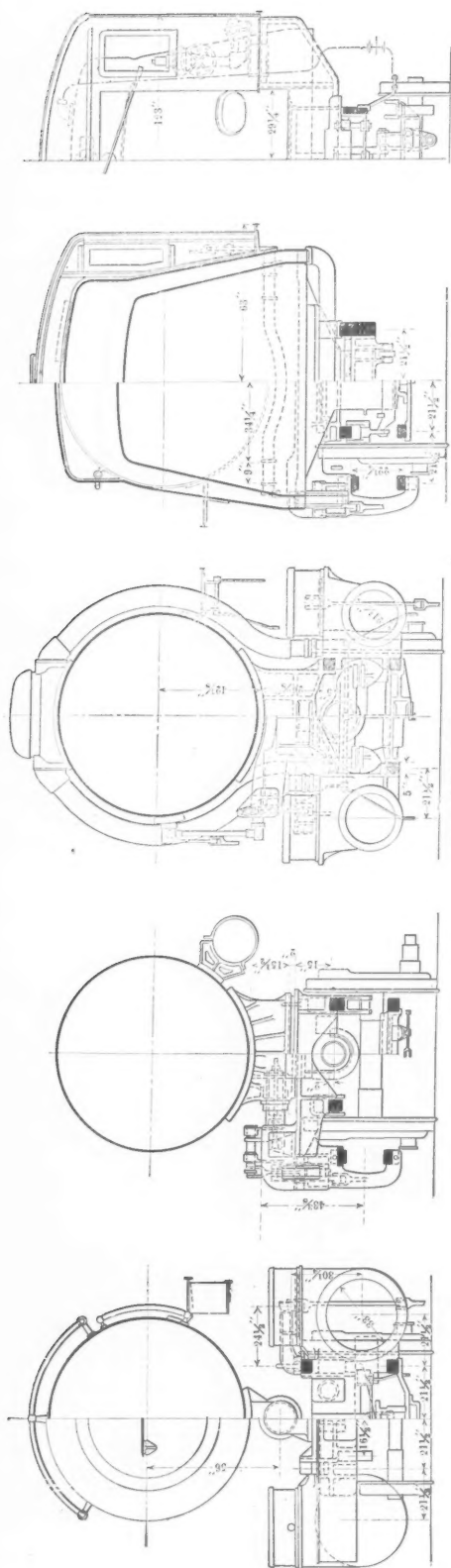
Central of Georgia.	Mobile & Ohio.
Chicago Great Western.	Northern Central.
Colorado & Southern.	Philadelphia, Baltimore & Washington.
Erie.	Pittsburg & Lake Erie.
Kansas City Southern.	St. Louis Southwestern.
Minneapolis, St. Paul & Sault Ste. Marie.	

#### Increases of \$50,000, or more:

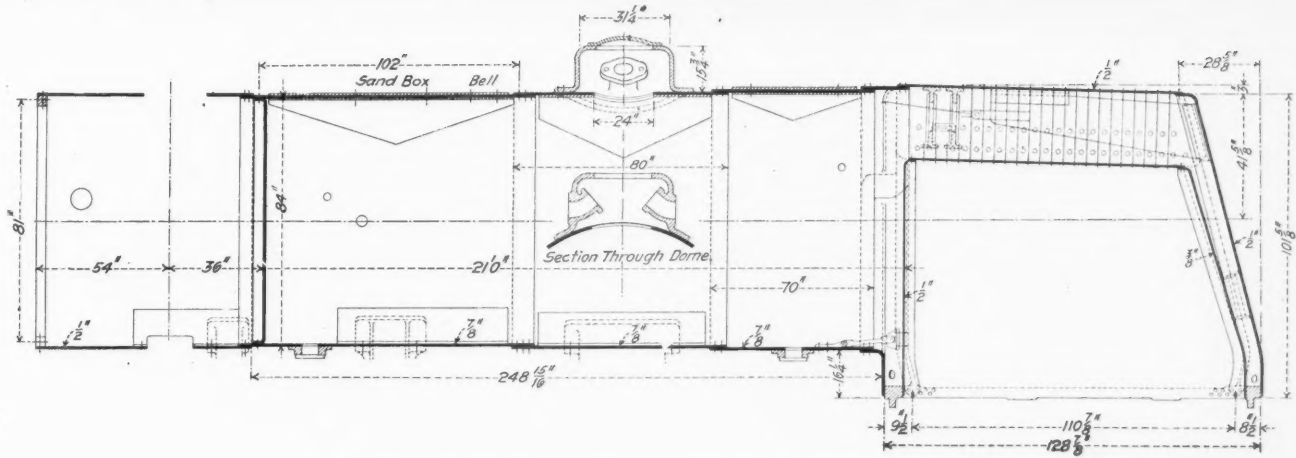
Chicago & Alton.	New York, Chicago & St. Louis.
Hocking Valley.	New York, Ontario & Western.
Michigan Central.	Toledo & Ohio Central.
Nashville, Chattanooga & St. Louis.	Wheeling & Lake Erie.

a great deal of attention not only on account of its novelty of design, but because its great weight of 334,500 lbs., all of which was on the driving wheels. The engines built for the Great Northern are heavier, but as a portion of the weight is carried by front and rear trucks the weight on drivers is reduced to less than that on the Baltimore & Ohio engine or to 316,000 lbs.

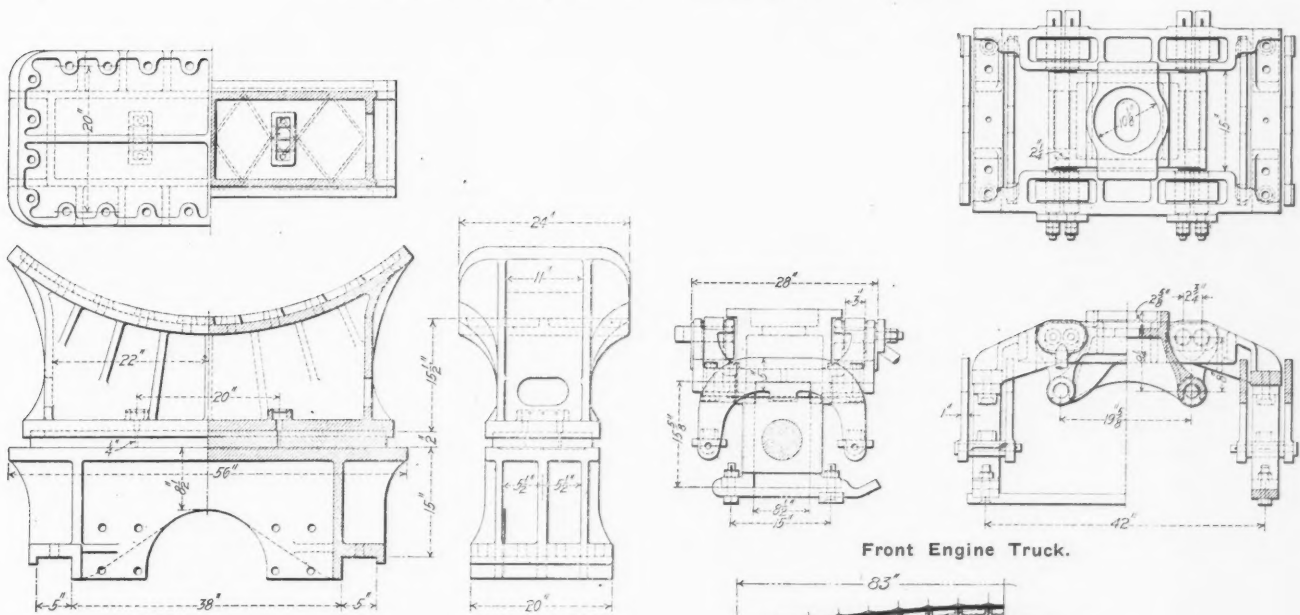
The essential and characteristic feature of the Mallet compound is the division of the power into two distinct units, the high and the low pressure, carried in two separate frames and coupled together by flexible steam connections. The high-pressure cylinders and frame, which are placed at the rear, are rigidly attached to the boiler, while the low-pressure truck is pivoted and requires a flexible steam connection from the high-pressure cylinder as well as one for the exhaust. Neither frame is pivoted in the true sense of



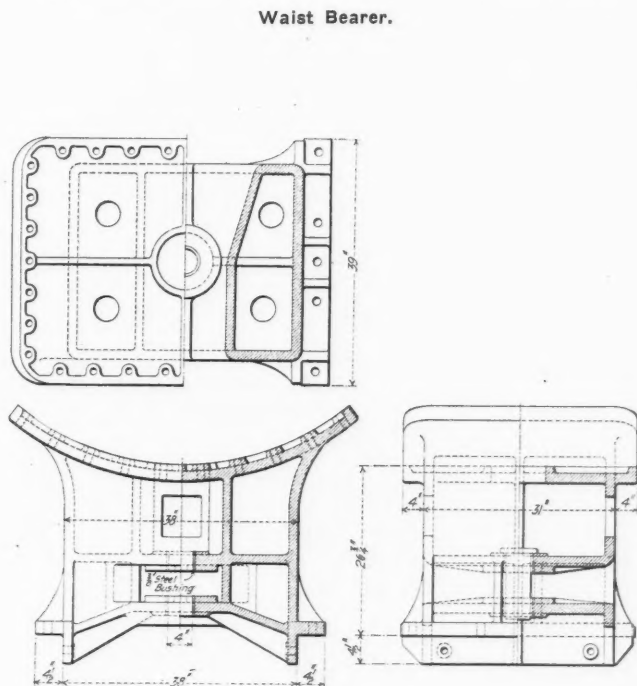




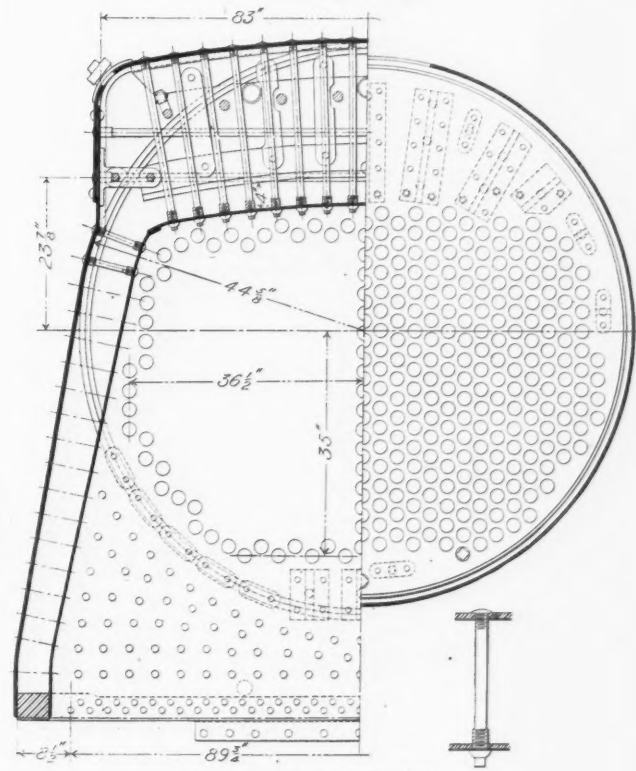
Boiler of Mallet Compound Locomotive for the Great Northern.



Front Engine Truck.



Cylinder Saddle.



Cross Section of Firebox.





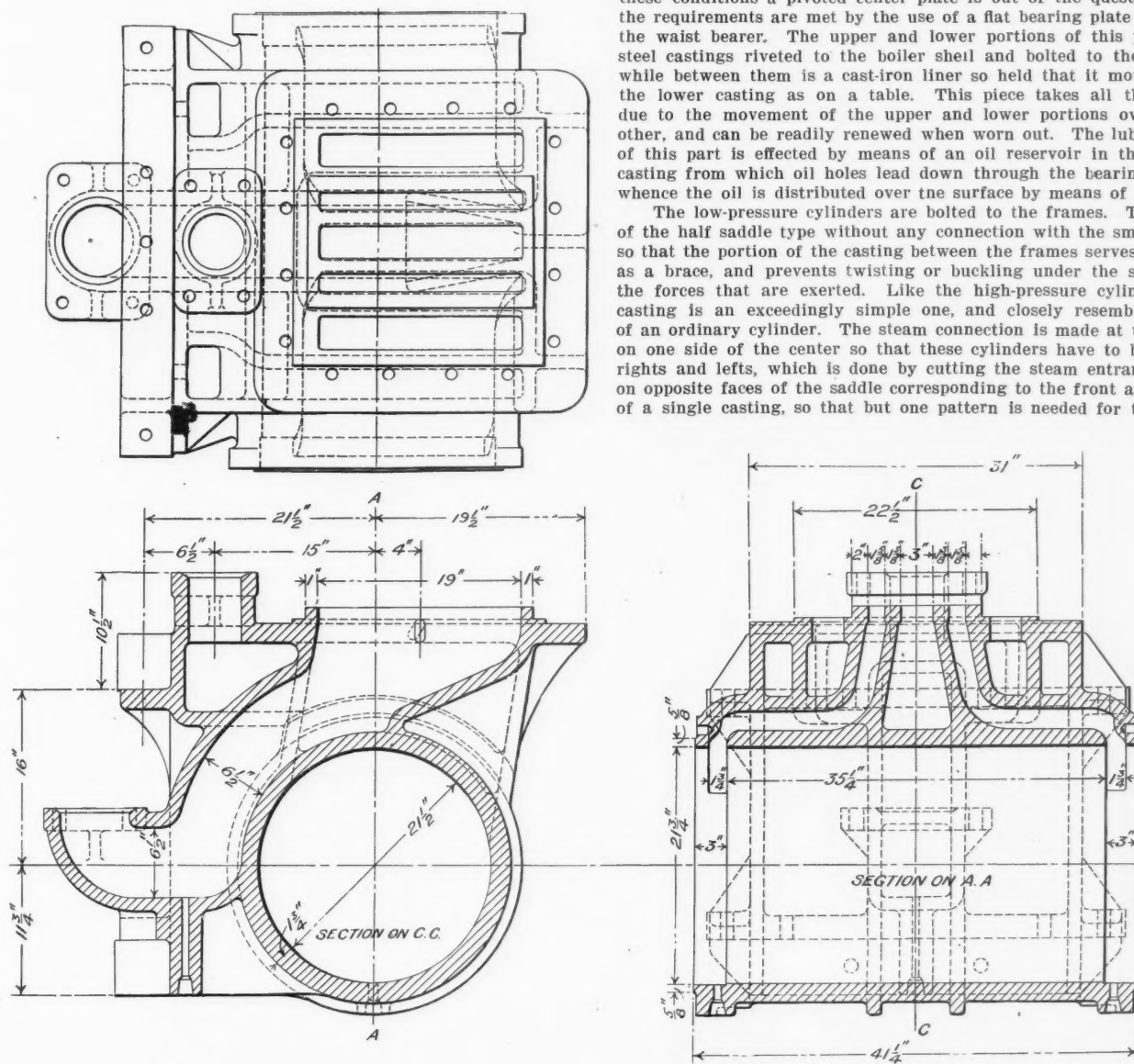
the word, though the forward one is capable of turning beneath the boiler. As arranged, the engine may be likened to the frames and running gears of two mogul (2-6-0) locomotives placed rear to rear, and there coupled together, upon which the boiler is loaded very much as long material might be loaded upon two flat cars.

Turning now to the details of the parts, the boiler is riveted to the saddle of the high-pressure cylinders just as the ordinary saddle is riveted to the smokebox and rests upon the rear frame at each side. It has an opening in the center for the reception of the tail or radius bar by which the tractive effort of the low-pressure cylinder is transmitted direct to the rear frame without putting any stress upon the boiler. This connection is made by means of a 4-inch pin set in steel bushings, which are pressed into holes bored in the saddle as indicated in the engraving. The lead from

exhaust it passes between the frames and reaches an elbow cast on with the cylinder, by which it is turned up, as shown on the engraving of the high-pressure cylinder. It is from this point that the flexible system of steam piping starts.

Before entering into the details of the piping, the connection of the forward frames with the boiler and the cylinders will be considered. It is evident that this connection must be an exceedingly flexible one. Not only must these frames be free to turn beneath the boiler, but they must have a longitudinal and transverse motion as well. The longitudinal freedom is demanded by the possibility of wear, expansion and other causes producing a difference in the distance between the high and low-pressure frames. The transverse freedom is necessitated by the fact that the boiler is at all times in alignment with the rear frames, so that upon curves its center cannot coincide at any point with that of the front frames. Under these conditions a pivoted center plate is out of the question, and the requirements are met by the use of a flat bearing plate beneath the waist bearer. The upper and lower portions of this part are steel castings riveted to the boiler shell and bolted to the frame, while between them is a cast-iron liner so held that it moves over the lower casting as on a table. This piece takes all the wear due to the movement of the upper and lower portions over each other, and can be readily renewed when worn out. The lubrication of this part is effected by means of an oil reservoir in the upper casting from which oil holes lead down through the bearing plate, whence the oil is distributed over the surface by means of grooves.

The low-pressure cylinders are bolted to the frames. They are of the half saddle type without any connection with the smoke-box, so that the portion of the casting between the frames serves merely as a brace, and prevents twisting or buckling under the stress of the forces that are exerted. Like the high-pressure cylinder the casting is an exceedingly simple one, and closely resembles that of an ordinary cylinder. The steam connection is made at the rear on one side of the center so that these cylinders have to be made rights and lefts, which is done by cutting the steam entrance hole on opposite faces of the saddle corresponding to the front and back of a single casting, so that but one pattern is needed for the two.



High Pressure Cylinder for Mallet Compound Locomotive—Great Northern.

this pin is flared up and down so that there can be considerable difference in the level of the frames without any binding. The rear frames are thus rigidly attached to the boiler at a point 7 ft. 2 1/2 in. in front of the outside throat sheet. The firebox rests upon the frames at the rear, so that the boiler is at all times in alignment with them. The high-pressure cylinders are bolted to the frames. For the top rail the bolts for the cylinder and saddle are the same. At the bottom the cylinder is bolted by itself, as the saddle has no connection at that point. The cylinders being thus rigidly fastened to the boiler, there is no need for a flexible connection to the dome, so that an ordinary curved steam pipe with ground ball joint connections at the ends is used to lead the steam from the dome direct to the steam passages of the cylinder casting. Here the arrangements are almost identical with those of a simple engine. The steam passage is forked and enters the steam chest at each end. After doing its work and being discharged into the

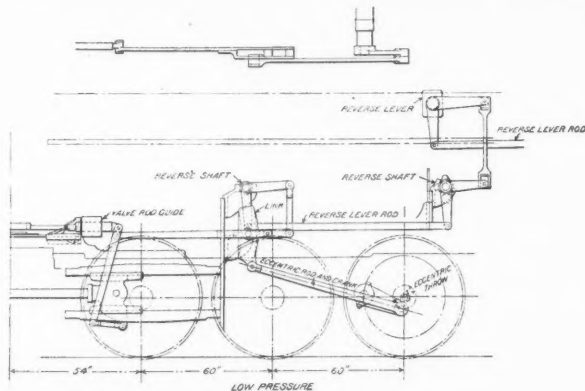
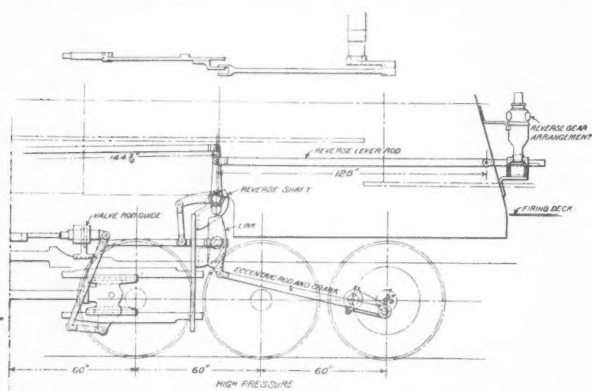
The interior passage A thus extends the whole width of the saddle with conduits leading off at each end to corresponding points in the steam chest. A slide valve distributes the steam and finally delivers it to the exhaust passage that is carried out between the rails of the frame where it makes a right angled bend upward for connection with the exhaust pipe exactly as in the case of the high-pressure cylinders, except that here the centers of these passages are brought so near together that both deliver into a single casting bolted to the top of the saddles and over the union between the two.

Turning now to the flexible system of piping alluded to, the general plan of the cylinder connections shows the system leading from the high to the low-pressure cylinder. The vertical outlets of the two exhaust passages are connected by a cast tee, where the ordinary ground ball joints are used for tightness. Into the back of this tee a pipe leading to the starting valve in the cab is

tapped, by which live steam is admitted to this pipe and thence to the low-pressure cylinders.

By referring to the plant it will be seen that the coupling pin, by which the front and rear frames are connected, is the transverse center line of the cylinders. As this pin passes through a tail piece that is rigidly bolted to the front after the manner of the ordinary deck plate, it is evident that the whole of the front pair of frames with the attached cylinders and machinery swings about this pin as a pivotal point. Hence if the steam pipe is fitted with a

pipe allowance must be made for a relative motion of the cylinder saddle and the smokebox in three planes. There is the transverse motion due to the swing of the boiler over the frames; the longitudinal motion due to the variation in frame positions and the vertical due to wear, inequalities of the track and the like. These conditions are met by the arrangement of the exhaust pipe shown in the engraving. A casting, already referred to, is bolted to the cylinder saddle and covers both exhaust openings. This casting is in the form of an elbow that turns to the rear and forms the shell of



Reversing Gear; Mallet Compound Locomotive for the Great Northern.

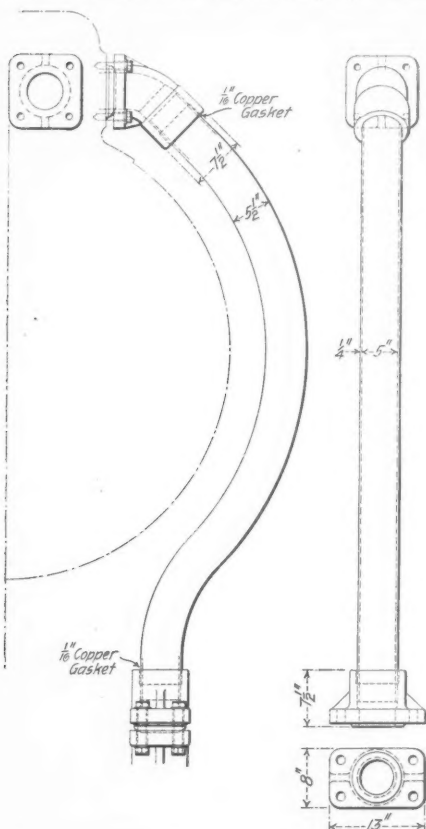
universal joint at this point it can be led off in any direction, and always keeps in alinement with the front frames, thus avoiding the necessity for a second ball joint. This is what has been done. The center of the ball joint is located directly below the center of the coupling pin in the high-pressure saddle and thence the steam pipe is led to the low-pressure cylinders. Just before reaching the saddle it is forked and the two legs are attached to the right and left hand cylinders, respectively, by means of the usual bolted

ball joint connection. The spherical joint at the rear thus provides for all vertical and transverse variations in the alinement of the two frames. Variations due to expansion and wear that change the longi-

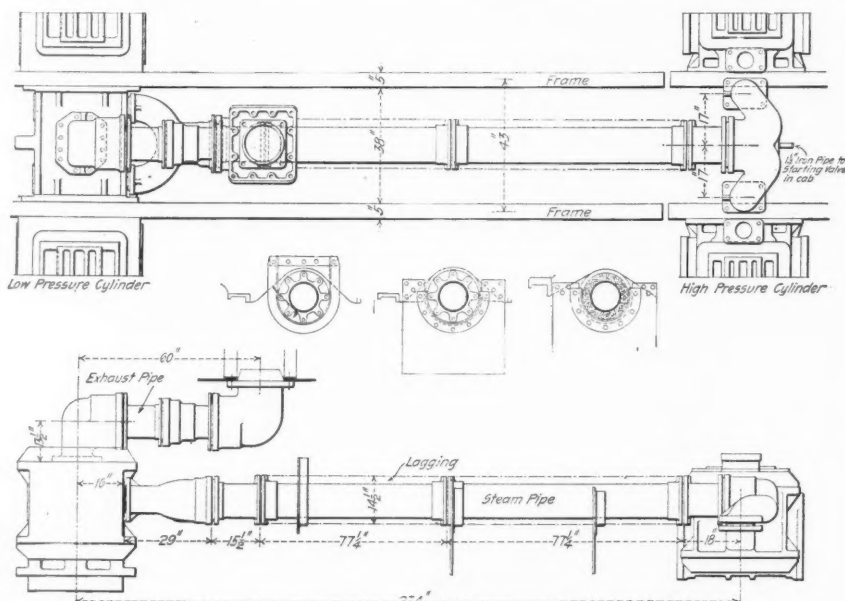
tudinal distances are provided for by a slip expansion joint with a gland and packing box in the forward Y by which the steam is delivered to the two cylinders. It is, of course, evident that this pipe, connecting the two sets of cylinders, also serves as an intermediate receiver.

The conveyance of the exhaust from the low-pressure cylinder is really a much more complicated matter than that of leading it forward from the high-pressure cylinder. In the case of the exhaust

firebox, the construction varies from the strict Belpaire design in that the roof and crown sheet are both crowning instead of being flat. The curves of the two sheets are, however, struck from the same center, thus maintaining a constant distance between them and keeping the staybolts truly radial to both, and retaining the essential feature of the Belpaire firebox. The water legs widen from 7 1/2 in. at the top to 5 in. at the bottom, by which a liberal allowance is made for the rising currents of steam. The sling



Outside Steam Pipe for High Pressure Cylinder.



Cylinder Connections.

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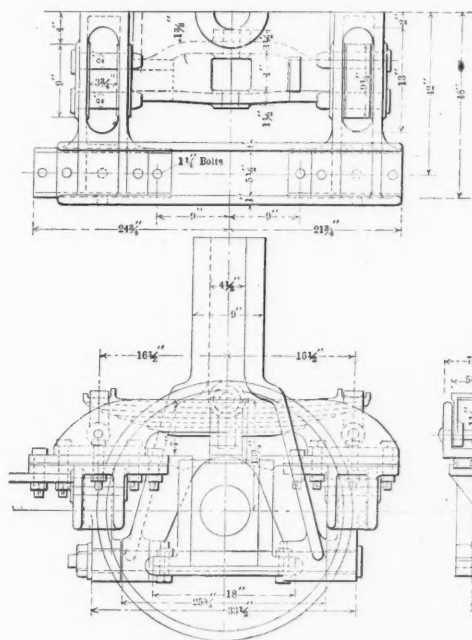
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stays at the front end of the firebox are suspended from T bars riveted to the roof sheet and carrying similar bars that might be called suspended crownbars that are attached directly to the crown-sheet. The tubes have the extraordinary length of 21 ft. or 75 per cent. in excess of what would have been considered an average length twenty-five years ago. The crown-sheet has a slight slope down toward the rear, and the foundation ring is horizontal. The dome and its cap are of steel castings, an innovation used in order to facilitate the making of the steam pipe connections, as indicated in the cross section. Beneath the two sand boxes the boiler shell is strengthened by plates riveted on inside and out, and a similar plate is riveted around the dome opening as a stiffening ring. The outside diameter of the front course of the shell is 84 in., and the thickness of the plates used is  $\frac{7}{8}$  in.

The locomotive, as a whole, has already been likened unto two mogul loco-

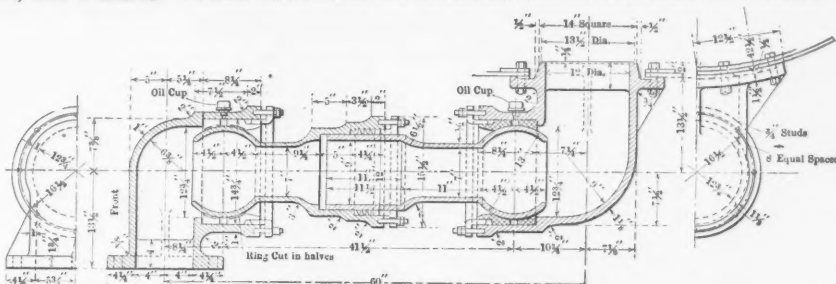
As in the case of the Baltimore & Ohio locomotive the Walschaert gear is used for the operation of the valves. Four distinct sets of this motion are used, one for each cylinder, and they are so connected that they are manipulated by a single reverse lever or the McCarroll air reversing mechanism. The ordinary reach rod extends to the reverse shaft lever of the high-pressure gear, and operates it in the usual manner. From an upper connection on this lever an extension of the reach rod runs forward to a downwardly projecting arm on an intermediate reverse shaft for the low-pressure motion that is attached to the boiler. A hanger reaches down from the horizontal arm of this shaft to a second



Side Bearing Radial Truck.

motives, and this is borne out by the construction and arrangement of the trucks. They are both of the two-wheeled or pony type, with radius bars connected in the usual manner. They differ from each other in that the forward truck has a center bearing, and the rear side bearings. The front truck is, therefore, substantially the same as the ordinary pony truck with axle box yokes for the spring suspension and a swing motion for the center plate.

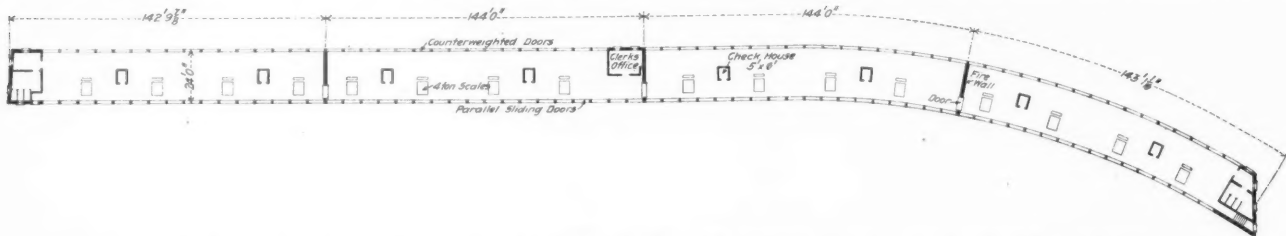
The rear truck has side bearings, but, as will be seen from the engraving, they are brought in so close to the center that their effect in preventing a tilting of the frames will be almost a negligible quantity. In this semi-elliptic springs are used over the axle boxes, and the frame is made continuous by means of yoke bars extending from front to back between which the springs are placed.



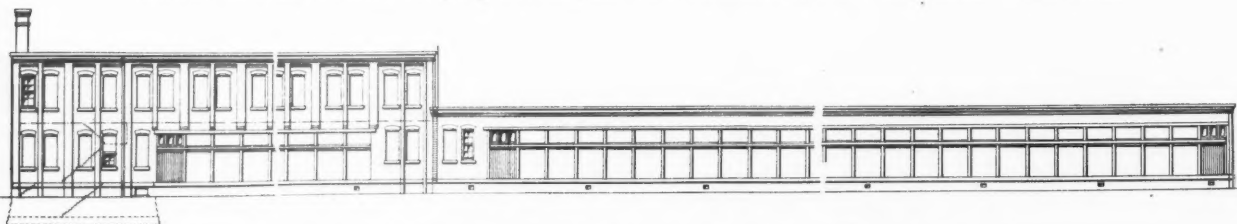
### The New Freight Terminal at St. Louis of the Rock Island-Frisco Lines.

Our issue of September 21 contained some notes taken from the report of Messrs. Robert Moore and Albert T. Perkins, Consulting Engineers, to the Municipal Bridge and Terminals Commission of St. Louis concerning the freight facilities of that city. As is generally known, St. Louis has for some years suffered seriously

The Frisco has a good-sized freight house a short distance east of the Union Station and therefore about a mile southwest of the new terminal. The Rock Island has been using the Louisville & Nashville facilities already mentioned. The site for the new terminal was all valuable improved property, occupied by stores and dwellings, and was acquired at great cost, the outlay in round numbers approximating \$2,000,000. As appears from the plan herewith, it lies between Biddle street on the south and O'Fallon street on



First Floor Plan of Outbound Freight House, St. Louis Terminals of the Rock Island-Frisco Lines.



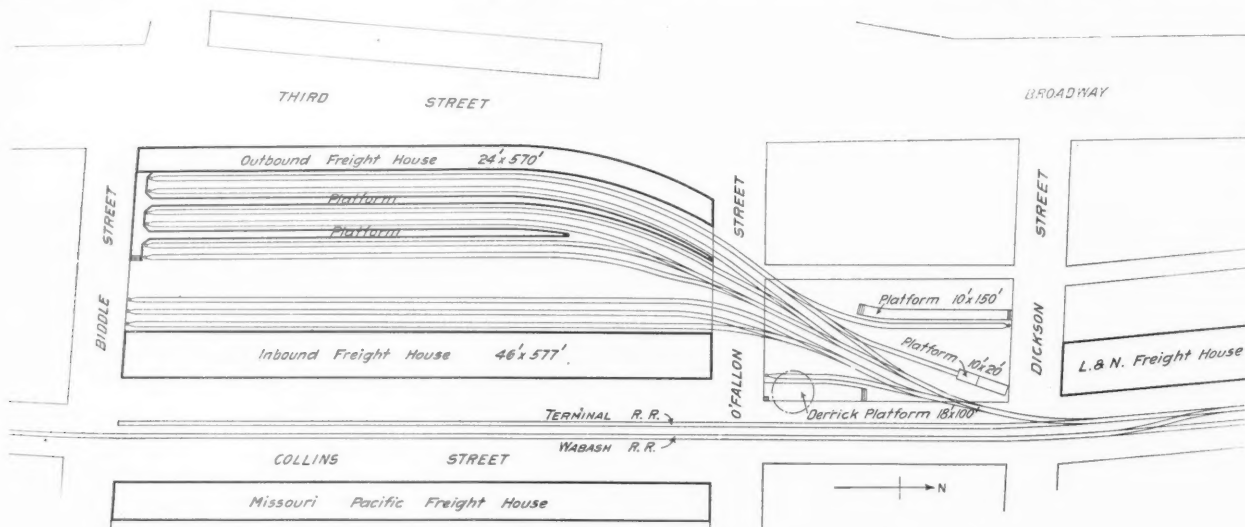
Collins Street Elevation, St. Louis Terminals of the Rock Island-Frisco Lines.

from inadequate facilities of this character. This, in conjunction with the presence of a great river, dividing the district formed by the two cities on its sides, has been the cause of much congestion of and delay to freight at the St. Louis gateway. The total amount of freight received and forwarded at St. Louis and East St. Louis in 1905 was 40,000,000 tons.

During the past 12 months several of the larger systems which previously had been deficient in freight terminal facilities in St. Louis have been engaged in providing terminals that not only answer present requirements but will be adequate to the city's growing needs for some time to come. The Wabash was the pioneer in this movement, its new terminals at Franklin avenue and Third street being described in these columns last December (Dec. 29, page 604). The Rock Island-Frisco system is now engaged in a

the north, and between Collins and Third streets on the east and west respectively, at the junction of the latter with Broadway. The half square on O'Fallon, Collins and Dickson streets is also included and is occupied by the entrance tracks of the terminal. The relation of this section to the remainder of the property is such as to require all of the tracks to enter the freight house area on a curve. As a result the north end of the outbound house had to be swung around to parallel the adjacent track.

The outbound house is 24 ft. x 570 ft., and the inbound house 46 ft. x 577 ft. The latter is two stories high for 208 ft. at the south end, for offices. Also, it will be observed that the outline of a future six-story warehouse, for storage of inbound freight, is indicated above and including the one-story portion of this house, with a total height of 84 ft. This may and probably will not be



General Plan, St. Louis Freight Terminals, of the Rock Island-Frisco Lines.

similar undertaking on property situated immediately north of the Wabash terminal. This district, which is just north of and therefore in proximity to the business center of the city, and also quite close to the west end of the Eads bridge, has developed into an important freight house locality. Besides the two large terminals above mentioned, the new Missouri Pacific terminal lies immediately east of the Rock Island-Frisco site, the Louisville & Nashville, and Missouri, Kansas & Texas both directly north, and the Burlington just southeast. All are served by the Terminal Railroad Association's tracks, the Wabash, however, also having its own track to its terminal.

needed for some time to come but the foundations, walls, columns, etc., of the present structure are designed to sustain the load which the additional five stories will impose. This explains the unusual dimensions of these parts of this one-story building. A primary object in the design of the houses was to obtain the most economical construction consistent with the requirements of the situation. High-pitched roofs, steel framework, etc., were omitted, and such use made of iron, brick, etc., as compliance with the fire ordinance required. The typical cross-sections included in the illustrations show the character of construction. The concrete foundation walls are reinforced by 5/8-in. Johnson corrugated steel

bars, as indicated on the drawing. Both houses have 12-ft. canopies on the team side and 6-ft. canopies on the track side. Parallel sliding wooden doors are provided on the track sides and counter-weighted sliding doors on the team sides. Not only is this type of door cheaper but it was regarded as being more satisfactory in many ways than other types of doors intended for similar service. A detail of the door and framing is included in the illustrations.

The space of 152 ft. between the parallel portions of the houses contains nine tracks and two 8-ft. transfer platforms. It will be

criticise the plans and make suggestions. The contractor is the Kellerman Construction Company, St. Louis.

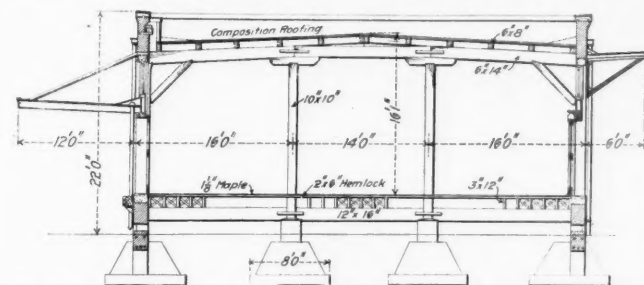
#### The Working of the Liverpool & Southport Electric Line.

At a session of the International Railway Congress last year the following remarks were made by Mr. J. A. F. Aspinall, Lancashire & Yorkshire Railway (Great Britain):

The description which Mr. Gerard has given of the Liverpool & Southport Railway is so complete that I do not think I can add anything to it of a technical character, but I fancy I understood him to say that he considered that electric traction would result in economy of working. We did not enter into electric traction with any idea that we should get economy of working. We did not expect to save money; we expected to make money—two very different things. We started to operate our line on the 22d of March last year, and, therefore, we have had practically twelve months' experience, and the results in the increase of traffic have been most satisfactory, but the results of operation have shown us that we were right in expecting that it would cost more money to work than it did when we used locomotives in the ordinary way. The cost per ton-mile for coal, for instance, is greater. The cost for the train crew is less, and that is less because we are able to get a larger mileage per day out of our stock. Perhaps I might mention here that our train crew consists, with our express trains, of two men. The trains are formed of four cars 60 ft. long, and sometimes five cars, but generally four cars with the express trains. There is one motorman, there is one guard. There are none of the numerous men that you carry in this country upon the different platforms. As soon as the express train starts it is the duty of the guard to go forward into the motorman's compartment so that he may be there to assist him should it be required. With regard to the stopping trains, we have three men, a motorman, a guard in the front baggage compartment, a guard in the rear baggage compartment, and we have a trouble which you have not got here, because we have two classes, third class and first class, and we have to handle the baggage which is brought by the ordinary passenger for any of the intermediate stations. The journey over our Southport line occupies 37 minutes, and we stop 14 times. We allow 15 seconds for each stop, and that 15 seconds is found to be sufficient to enable us to let in our passengers and to get in our baggage, and the public themselves open the doors on the platforms and shut them. We have been considerably assisted in getting our passengers in and out by having issued in the first instance notices to the public requesting them to get in at the rear door of the train and to get out at the front door of the train. That request has been complied with in a very extraordinary degree, and it enables us to load and unload our trains within the prescribed time.

So far as the advantages of electrical equipment are concerned, one of the things which led us to change from steam to electricity on this particular line was the difficulty that we had at our terminal station at Liverpool in handling the large number of people who have to come in during the rush hours, and it is quite obvious that if you work into a terminal station with steam trains, every time a steam train comes in and goes out, you have four platform operations and eight signal operations. First of all the train comes in; then a locomotive follows it, that is two; then the train goes out, that is three; then the locomotive which brought it in goes out, that is four. That is four platform operations, which means eight signal operations. That all takes time. Now, with the electric train, you come in; that is one. The motorman goes to the other end of the train; the train goes out; that is two. You have only two platform operations, four signal operations. The result is that you double your terminal accommodation. In addition to that, it so happened that we had upon this particular line four tracks going out for a certain distance toward Southport. We were able, as a consequence of the electrification, to relinquish the use of two of those tracks and devote them to freight train service; but the number of passengers traveling has become so great, through the increase, that we have almost immediately to equip those tracks with the third rail and begin to use them partially again during the rush hours for passenger service.

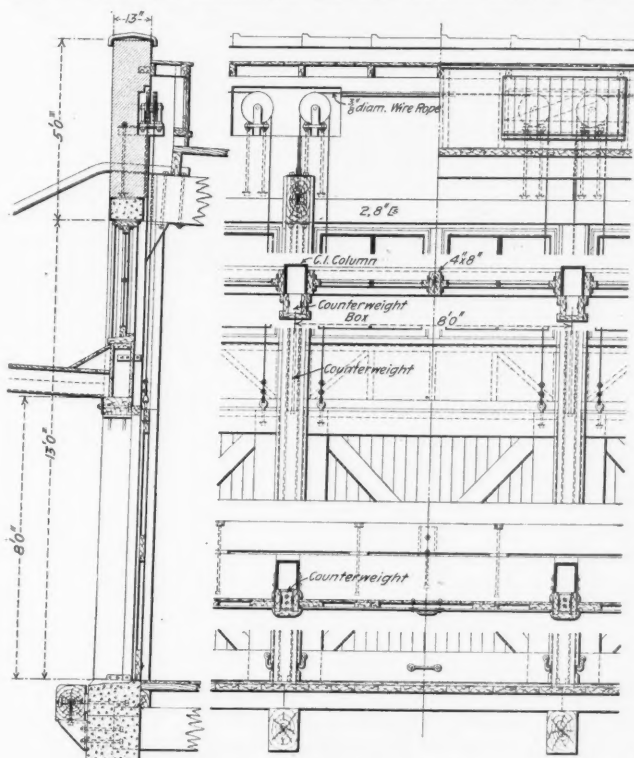
So far as the original cost is concerned, it does not seem to be possible, dealing with a line such as that which Mr. Gerard has described, to run the service which he has given—to run coaches such as we have, which are much larger than the coaches which you use upon your subway, say, in New York, and which are much more like main line coaches—it does not seem possible to look forward to equipping such a line with electric traction for less than £20,000 per mile, and that roughly, I think, represents something like three and a half times the cost of equipping it for steam traction. The result is that when you come to add your operating costs to your interest and depreciation, there is no doubt that it will cost you more money per ton-mile run, though you may very well get it back again by the very large increase in passenger traffic. I want to repeat that it is not a question of saving money;



Cross Section Through Freight House, New St. Louis Terminals of the Rock Island-Frisco Lines.

observed that these latter are joined at the south end to a 10-ft. platform fronting on Biddle street. This plan provides a good arrangement for handling agricultural implements, vehicles, etc. There is an unoccupied space 40 ft. wide in this area which will be graded for a driveway, converting the adjacent track on each side into a team track.

The local freight offices will be located on the second floor of the inbound house. The outer office will contain a hundred clerks and special attention was given to the provision of suitable ventilation for their quarters. Ventilating fans of ample capacity are to be used, so that windows need not be opened at all for this purpose. Ample toilet facilities and all other necessary conveniences for the comfort and accommodation of employees are provided. The buildings are to be steam heated and electric lighted. The offices will have combination gas and electric fixtures. On the



Details of Door, Team Side.

first floor of the inbound house is a room 14½ ft. x 21 ft. to be used as a cooper shop for repairing damaged boxes, barrels, crates, etc.

It is expected to have the terminal ready for business by the first of November. Its total cost will be approximately \$2,250,000, the greater part of which is for the site, as already explained. The plans were prepared under the supervision of Mr. J. B. Berry, Chief Engineer of the Rock Island, by Mr. A. T. Hawk, Architect. The local freight officers at St. Louis were given full opportunity to



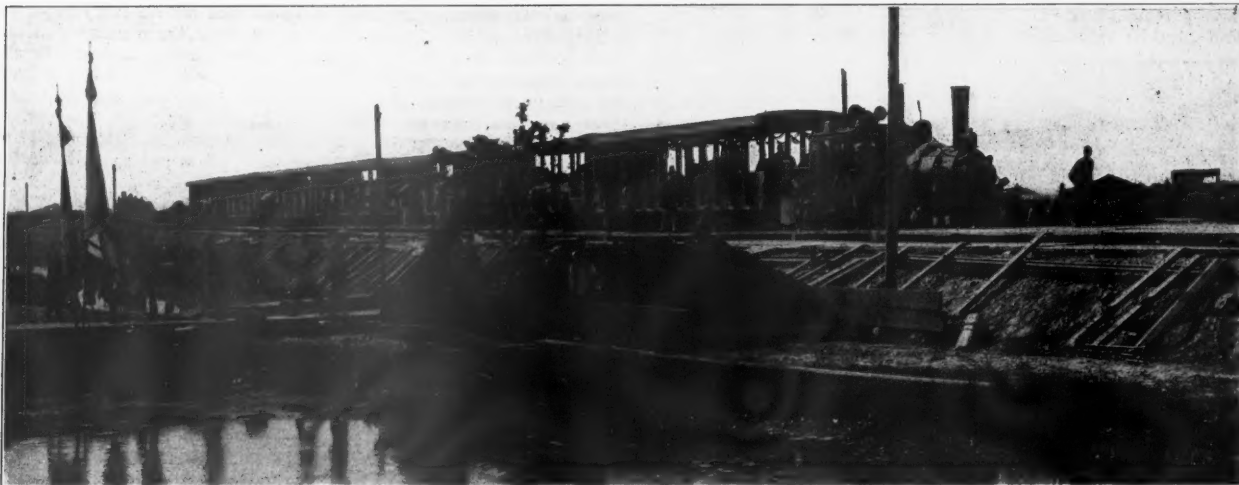
It is a question of making money. (Applause.) Therefore the conclusion of Mr. Gerard's report, in which he says: "In England, on the lines where electric working is now in operation, the electrification is attended with an increase in the number of trains and consequently in the facilities offered to passengers." I need not read all that, but I merely want to say that one's own conclusions agree with that.

Will you permit me to add, Mr. Chairman, that we do not find that the weight of what we may call the locomotive equipment of the train is any less than it would be with the steam locomotive; and dealing with main line work, there is no doubt that the aggregate weight of the motors, the controllers and the electrical equipment will, in almost every case, come to as much as, if not more than, the weight which would be required if the train were going to be hauled by a steam locomotive.

#### Canton-Hankow Equipment.

The accompanying photograph was taken at the opening of a branch line near Canton, China, of the Canton-Hankow Railroad. The locomotive is one of many sold to this company by the Manhattan Elevated Railway, New York City, when the elevated lines were electrified several years ago. On the roof of the cab can be seen the signal disks formerly used to indicate down which avenue in New York City the train was to go, and whether it was an express or a local. It is also interesting to notice that these locomotives now pull seven cars, which are probably heavier than the five-car trains used in their former service in New York. The cars, which are second-class passenger, were originally flat cars, and were

body, which has been referred to a joint committee, for the incorporation of a railroad from Hartford to New Haven. However beneficial in general such improvements may be, it is very certain that they may be adopted under such circumstances as to produce more harm than good, and may result in great injury and injustice to private property. A railroad is a monopoly in a peculiar sense. On a canal or turnpike every citizen has a perfect right to use his own vehicles—not so on a railroad. The carriages upon that must all belong to the proprietors of the road or run by their especial permission, and must be subject to one superintendence. In the monopoly now contemplated your memorialists are informed and believe that, although no names appear on petition but those of the citizens of this state, yet a great majority of the interest is to be owned and held by strangers, citizens of other states, proprietors of those great and overwhelming establishments of steamboats and railroads which now monopolize the conveyance of passengers between the cities of New York and Philadelphia, and are endeavoring to seize the exclusive right through this state and Long Island Sound, and unite the whole with such additions as they may hereafter acquire under one power. Should they, by aid of legislative groups and immense and increasing wealth, extend into Massachusetts and reach the capital of New England a traveler who would enjoy the advantages of a conveyance between Boston and Washington, must submit to such terms as they please to prescribe. No line of steamboat not connected with that company could partake of the right of conveying passengers on these long and frequented routes. A passenger entered at Boston or Hartford for Philadelphia or Washington would pay his fare at the commencement of his journey and be lost to every intermediate conveyance. Thus all competition would be put down and the great



Second-Class Passenger Train, Canton-Hankow Railroad.

also shipped from this country. The line near Canton is well ballasted with rock, but the rest of the road running up to Hankow is ballasted mostly with sand. For through traffic heavier locomotives of the Mogul type are used.

#### The Archaic Resistance to Railroads.

Practically the earliest railroad opened to traffic in Connecticut and one of the earliest opened in New England was the Hartford & New Haven line, between those two cities. It was opened in 1839, after having been incorporated in 1833 with power to "locate, construct and fully complete a single double or treble railroad or way," and also to use "the power and force of steam of animals or of any mechanical or other power or any combination of them"—terms that strangely anticipated by almost three-quarters of a century the charter needs of the up-to-date railroad project in the direction of electricity. The Hartford & New Haven road, with its later extension to Springfield, Mass., became—before its absorption in the present New Haven system—one of the most prosperous roads in the country, paying from 12 to 16 per cent. annual dividends, with frequent distributions of new stock. But at the outset the enterprise encountered much opposition, especially from representatives of the old "turnpike" interests. The nature of that opposition is curiously shown by the subjoined petition addressed to the Connecticut legislature in 1832, and signed as "overseers of turnpike stock" by Simeon Baldwin, Roger Sherman and Epaphroditus Champion, three of the most prominent citizens of the state. It is reprinted from the volume "In Olde Connecticut," by Charles B. Todd, recently published:

"Your memorialists, to their very great surprise, have lately been informed that a petition is now pending before your honorable

sums now invested by and extensively divided among our citizens, tending to cheapness and convenience, as well as to equality of rights and privileges, would be annihilated and the expense of traveling would depend on the will and pleasure of that united interest which would find its advantage in the highest possible rates of fare.

"By the grant now contemplated four turnpike companies between New Haven and Hartford, in which many widows, orphans and persons in moderate circumstances have invested their property, the steam navigation from Hartford to New York, the steamboats, between the latter city and New Haven and many other of the vested interests of our own citizens would be utterly destroyed."

#### Foreign Railroad Notes.

The *Jiji Shimpō*, a Tokyo newspaper, has arranged, after consultations with the railroad bureau, the Nippon Railway and the Ganyetsu Railway Companies, to run an exhibition train, in which the merchandise of leading stores in Tokyo will be exhibited for sale. The train will consist of three large passenger carriages. One or two cars will also be attached as storehouses. The train was scheduled to cover a distance of about 1,500 miles in 40 days.

The Cape of Good Hope Government Gazette publishes the texts of two acts promulgated by Cape Colony, South Africa, one providing for the construction, equipment, maintenance, etc., of certain lines of railroad to have a total length of 499 miles at a cost of \$9,860,824, and the other authorizing the raising of a loan for the purpose of new and additional railroad works, including the doubling of a portion of line at \$277,390; locomotive workshops, \$121,662; ice-making machinery, \$243,325; electric lighting, \$243,325.







# GENERAL NEWS SECTION

## NOTES.

In the Supreme Court of Massachusetts at Boston, September 28, the New York, New Haven & Hartford was fined \$1,000 for contempt of court in not obeying an injunction to remove certain tracks across Magazine street.

On the Memphis division of the Southern Railway "train auditors" are to be employed. The train auditor makes occasional and unannounced visits to different trains, taking up the financial work of the conductor and continuing in charge of it to the end of the trip.

It is reported in Pittsburg that beginning with November all of the roads in the Central Passenger Association will make cash fares 15 per cent. higher than the prices for tickets, and that the excess thus collected will not be refunded. It is said that this is not forbidden by the Ohio two-cent law.

According to the *Chicago Tribune*, Mr. Midgley expects to have a co-operative car company ready to do business within three months. Mr. Midgley says that various railroad companies will join in a company, with a hundred millions capital, to furnish refrigerator, stock and other special freight cars.

A press despatch from Washington on Monday of this week says that the machinists employed by the Southern Railway, 800 in number, have struck for an increase of 25 cents a day in their pay. Protracted negotiations have been held between the officers of the road and those of the International Association of Machinists, but without favorable results.

The State Railroad Commission of Texas has notified the railroads that all passenger rates less than those prescribed by statute or by order of the Commission must be submitted to the Commission and approval of the Commission obtained, before being put in effect. In other words, all excursion rates must be referred to the Commission before being published.

The New York, New Haven & Hartford announces that it will run four through passenger trains each way daily, except Sunday, between Providence, R. I., and Fitchburg, Mass., by way of Worcester. These trains will run over the Boston & Maine from Worcester to Sterling Junction, 12 miles. Trains going north will have to be backed into the Union station at Worcester.

In spite of the reduction in passenger rates to 2½ cents a mile with an unlimited two cent mileage book made by the Pennsylvania, the Pennsylvania State Board of Trade is now proposing to keep up its agitation for the reduction of all classes of tickets to two cents a mile, and the Republican candidate for Governor in that state declares that if he is elected he will see that a two-cent rate is adopted on all the railroads of the state.

The City of New York, which has now for several months been operating a ferry boat line between Manhattan and Staten Island, five miles, has bought control of another ferry, that from Manhattan to Thirty-ninth street, South Brooklyn. The city will begin operating this line next Monday. The sum paid is reported as \$750,000, which appears to be the cost of the franchises, as the boats have not been bought. The city will lease the present boats until it can provide new ones.

The Attorney General of Massachusetts has begun suit in the Supreme Court against the New York, New Haven & Hartford on account of the ownership by that road of the stocks and bonds of Massachusetts street railways. The railroad company has disposed of its ownership in these properties to a separate corporation, but the Attorney General desires to question before the court the validity of some of the acts which were done by the railroad in connection with the transfer.

Both the Southern Pacific and the Atchison, Topeka & Santa Fe are continuing and increasing their efforts to publish throughout the country the need of skilled workmen in the building trades at San Francisco, and also laborers in railroad building, in fruit growing and in the Union Iron Works. Wages range from \$7 a day for bricklayers to \$2.75 for unskilled laborers, in San Francisco, and \$2 a day, with lodging, for laborers on new railroad work. Attention is called to the fact that the California winter is warm and sunny, permitting outdoor work to be carried on throughout the season.

According to the *Times-Democrat*, of New Orleans, the export grain traffic through that city has fallen off seriously because the Illinois Central, in consequence of the change in the Interstate Commerce law, has taken into its own hands the management of

its grain elevators there, abrogating the leases under which the elevators have heretofore been managed by two grain exporting companies. The quantities handled at these elevators in September were 220,000 bushels of wheat and 30,000 bushels of oats, whereas the average quantity of grain handled monthly during the past year has been 2,000,000 bushels.

The Society of American Florists & Ornamental Horticulturists has complained to the Interstate Commerce Commission of excessive rates charged on flowers by the United States Express Company. The members of the society ship large quantities from points in New Jersey and Pennsylvania to New York City, and they say that since last May the express company has doubled its rates, making them nearly ruinous. By this announcement we see how Mr. Hepburn's act has added a little poetry to the humdrum life of the Interstate Commerce Commission. As Secretary Moseley is himself a florist, out of office hours, the New Jersey complainants ought to be sure of a sympathetic hearing—in spite of the Secretary's impartiality.

The Federal Grand Jury at New York City on Tuesday of this week made public eight indictments for giving and receiving rebates. It is not clear whether this list is made up wholly of new indictments, or partly of those published several months ago, but there are some names which did not appear in the announcement made in the summer. The present list includes eight items, all apparently based on shipments of sugar from New York to the West. The names are: The American Sugar Refining Company; the American Sugar Refining Company, of New York; C. G. Edgar, Edwin Earle, Western Transit Company, Delaware, Lackawanna & Western, Northern Steamship Company, New York Central and Hudson River Railroad and Brooklyn Cooperage Company.

According to the *Barnesville* (N. Dak.) *Record*, a northbound and a southbound train of the Great Northern were recently held at stations 30 miles apart in the middle of the night by the error of a despatcher. An order was sent to train No. 7 northbound to meet train No. 6 southbound at Downer, while No. 6 was ordered to meet No. 7 at Averill, 30 miles further north. Neither of these stations has a telegraph office, so that the crews of both trains were left in suspense. After about two hours the northbound train sent on a hand car with a red lantern, to see what was the matter. It had not gone far before it met an engine which had been sent south on a similar errand. An order with negative lap certainly has its merits as a safety device. For convenience it is open to criticism.

In a rear collision on the Boston & Maine at Lansingburg, N. Y., October 4, five passengers were killed and 20 or more were injured. The regular day passenger train from Boston to Albany, standing at the station, was run into at the rear by a special train carrying troops bound for Newport News to embark for Cuba; and the two rear cars of the standing train were wrecked and knocked down a bank. The engine of the special train was also overturned, and the car behind it was wrecked. The special train consisted of an engine and 18 cars and approached the station on a descending grade at uncontrollable speed. An officer of the road says that the special was signaled at a sufficient distance to enable it to be stopped, and that the engineman answered the flag signal by two blasts of the whistle.

The Santa Fe has begun planting trees on its land in San Diego county, southern California. The tract is 8,650 acres in extent and is known as the Rancho San Diegito. It is near Del Mar. It will be converted into a eucalyptus grove. About 700 acres a year will be planted for a number of years. The wood will be used for ties and piles. F. P. Hosp, who has charge of this class of work, estimates that \$3,000 worth of timber for ties can be raised on one acre. The red gum will be planted, as this, as well as the sugar and iron bark varieties of eucalyptus, has been shown by experiments in Australia to last more than 25 years underground, while the blue gum will not last more than three years underground. The seeding will be done during the winter and the seedlings for the first year's planting are now in preparation. About 3,000 boxes of small seedlings are required.

At Lynchburg, Va., October 2, a conference was held between officers of the Norfolk & Western, the Chesapeake & Ohio and the Southern Railways and a committee representing religious bodies of Virginia, with a view to making an agreement concerning the running of freight and excursion trains on Sunday. Another conference is to be held soon, and it is proposed to draw up a bill, to be presented to the next Legislature, regulating the movement of trains on Sundays. The men at the conference were: Dr. W. W. Smith, Rev. W. W. Royall, Rev. Dr. R. H. Fleming, George E.

Caskie and H. H. Harris, of the committee, and President Stevens and General Manager Doyle, of the Chesapeake & Ohio; Second Vice-President Finley, General Manager Spencer and General Counsel Thom, of the Southern, and President Johnson and General Manager N. D. Maher, of the Norfolk & Western.

#### New Steamers for the St. Lawrence.

The Rutland Transit Co. will soon give orders for two new freight steamers to be duplicates of the steamers "Rutland" and "Ogdensburg" built for this company by the American Shipbuilding Co. This is one of the New York Central lake lines.

#### Reduced Freight Rates in Minnesota.

A press despatch from St. Paul, October 8, says that the railroads of Minnesota will accept the reductions in freight rates of 10 to 20 per cent. recently ordered by the State Railroad and Warehouse Commission. They have waived the right of appeal and sent formal notice, through a committee, that they will make the reductions. The decision was made at a meeting and was agreed to by all the roads to whom the order was issued, which includes all the roads in the State except a few logging roads. It will take at least two weeks to make up the tariffs and the roads want to make changes in their interstate tariffs at the same time. These last must be sent to the Interstate Commerce Commission thirty days before they go into effect, so that November 15 is the earliest day when the change can reasonably be put in effect.

#### Completion of the Pennsylvania North River Tunnels.

The two headings of the second or south tube of the Pennsylvania tunnels under the North river met on morning of October 9 and a party of engineers and invited guests walked through from the New Jersey end to Manhattan. Air pressure was turned on the south tunnel in the Manhattan heading in June, 1905, and in the New Jersey heading a month later. The two shields met about 100 ft. east of the center, the west shield having been pushed faster than the other. The north tube was opened through on September 12. The completion of these two tubes in about 15 months is a new record in the construction of submarine tunnels. There have been no serious accidents and no lives have been lost. It is expected to have both tubes lined and finished complete ready for running trains in 18 months.

#### Panama Canal to be Built by Contract.

It has been decided to ask contractors to bid on the work of digging the Isthmian Canal and invitations for proposals were issued by the Canal Commission last Tuesday. The form of contract under which the work is done was made public by Chairman Shonts, who also gave out a letter written to the Secretary of War, giving the Commission's reasons for its present action.

Each bidder must undertake the entire work of construction. No bar will be offered to corporations associating in the undertaking, but they must be legally organized into a single body with which the Government can deal. Bidders will not be considered who do not have available capital of \$5,000,000. A certified check for \$200,000 is required with each proposal and a bond of \$3,000,000 will be required from the successful bidder. The bidding is not limited to American contractors. All proposals are to be in before noon of December 12, when they will be opened. Proposals are to be expressed in terms of percentages of the estimated cost of construction which is to be fixed by a board of five engineers, three representing the Government and two representing the contractors.

Sixty days after signing of the contract actual work is to begin and the contractor is to take over all employees on the isthmus which the Commission does not wish to retain. No American employee is to work more than eight hours.

#### The Grand Trunk Pacific.

Charles M. Hays, president of this company, and vice-president and general manager of the Grand Trunk system, has returned from an extensive trip by horseback and wagon over the route of the new road, and tells of what he has seen.

"The great wheat growing region of Manitoba, Assiniboia and Alberta and the rich mineral regions of British Columbia, will afford a heavy traffic for the road and the district is so large that there is no danger of overbuilding railroads. The distance between New York and Yokohama over this route will be 1,500 miles shorter than the San Francisco route, 500 miles shorter than the Canadian Pacific and fully as much less than the Hill routes. "Our location on the Pacific Coast, being almost directly opposite the 'great circle,' where boats have to come before starting west, gives us an advantageous position. Then our harbor is second to none on the Pacific Coast.

"At Prince Rupert we have a harbor ten miles long and five miles wide with no limit to depth of water. Digby Island forms a natural breakwater and affords full protection. The entrance to the harbor is 2,000 ft. wide and 40 ft. deep.

"Our road is being constructed on a four-tenths of 1 per cent. grade, and we hope to cross the mountains with less than 1 per cent.

The maximum curvature in the mountains will be only six degrees. The road from Winnipeg to Edmonton, where we intersect the Canadian Northern and Canadian Pacific, is under construction and fully 60 per cent. of the grading has been done. We have promised the people of Edmonton that we will help carry out the 1907 wheat crop."

#### Harbor Improvements in Africa.

The Cape of Good Hope Government Gazette contains an act to provide \$281,770 for the purpose of improving the harbor works of East London and Mossel Bay, South Africa.

The following public works are projected in Algeria, North Africa: At Nemours it is proposed to spend \$660,000 on the construction of a port where vessels may anchor safely. The matter is now under the consideration of the Council-General of Ways and Harbors. At Arzew the sum of \$240,000 has been asked for harbor improvements. At Mostaganem the large jetty is to be put in thorough order. At Algiers a project is in view for joining the Island of Al-Djefua to the shore by a mole. At Port Gueydon the works for the protection of the jetty have now been completed, and a scheme is on foot to prolong the jetty. At Tizirt a prolongation of the landing stage is in contemplation. At Bone the works for the new phosphate quay and the making of a new quay at the mouth of the Seyhouse have been decided upon. The entire cost of the works in progress at this port will total \$1,628,000.—*Consular Reports.*

#### The Mexico, Oaxaca & Yucatan.

An interesting project is under way for building a railroad in the southeastern part of Mexico from Mexico City easterly to Merida, the capital of the state of Yucatan, running through the states along the isthmus between the Gulf of Campeche, which is a part of the Gulf of Mexico, and the Gulf of Tehuantepec, in the Pacific ocean. The Mexico, Oaxaca & Yucatan has been incorporated in Maine with \$1,000,000 capital, which is to be increased at the rate of \$32,000 gold for each mile of line built and equipped. First mortgage bonds are to be issued at the same rate per mile, and it is said that arrangements have been made for their underwriting and sale. The road is to be about 1,300 miles long; it will run from the City of Mexico southeast through the city of Puebla to Oaxaca, the capital of the state of Oaxaca, 360 miles, thence east to Santa Lucetia on the Tehuantepec National, and then northeast through the states of Chiapas, Tabasco and Campeche to Merida, which is about 30 miles inland from the coast of the Gulf of Mexico. From Concepcion, in Oaxaca, a branch is to be built southeast to the port of Belize, in British Honduras. Other branch lines will be built, making a total of about 300 miles. On the line from the city of Oaxaca to Merida, 750 miles, the Mexican government has agreed to pay a subsidy of \$12,800 gold per mile in cash and \$2,400 gold per mile in grants of public lands. It is proposed to acquire the San Rafael & Atlixco, a narrow gauge road running from the City of Mexico south to Atlixco, 108 miles, which is to be made standard gauge.

The country through which the new line will run is said to be as rich in minerals and timber as any part of Mexico. The road runs through 400 miles of hard wood forest, largely mahogany, and in Oaxaca there are extensive iron mines which can be worked profitably when the product can be shipped by railroad; they have been abandoned for some years as mule trains were the only available means of transportation. There are also large deposits of oil and coal. The company has ordered a large number of locomotives, all of which are to be oil burning. Preliminary surveys have been completed and construction, it is expected, will begin early next year. The President of the company is W. G. Seaver; W. S. Carter, of St. Louis, and W. J. Allen are Vice-Presidents; R. E. Briggs, formerly on the Mexican Central, is Chief Engineer, and Santiago Mendez, Inspector General of the National Lines of Mexico, is Consulting Engineer. R. C. Fraser, 10 Wall street, New York, is Secretary and Purchasing Agent.

#### Nationalization in France.

Rumors of the impending purchase of the Western Railway of France by the Government are again afloat, and investigations are at present being carried out with a view to presenting a report on the financial aspects of the proposal to the Chamber. The arguments used by those in favor of nationalization are much the same as elsewhere, and divided management and difficulty of arranging through rates are said to cause great hindrance to trade; after the companies agree to any given through rate, Government sanction has to be obtained. But even if the difficulties attending company administration were much worse than they are, the nationalization of the whole railroads of France would be, as in America or England, but a leap from the frying pan into the fire. With the exception of the Swiss railroads it is impossible to find any state-operated line which has shown the same energy or care for the public as have the best companies in France, such, for example, as the Nord. However, the purchase of the Ouest Railway will undoubtedly be a good thing for the shareholders, and the terms are likely to be fair.



## TRADE CATALOGUES.

**Derrails.**—Circular No. 43 of the Hayes Track Appliance Co., Geneva, N. Y., reproduces some excellent photographs of the Hayes lifting derail installed on several roads entering Chicago. A list is given of the number of these devices used on each of some of the more important railroads.

**The Yale & Towne Manufacturing Co.,** New York, is distributing attractive small pamphlets giving suggestions for selling Yale padlocks. The burden of one of these is a story of newly married life called "The Little Black Box."

**Self-Measuring Oil Tanks.**—S. F. Bowser & Co., Ft. Wayne, Ind., send a number of cuts of their self-measuring oil outfits. They are printed in colors, each on a separate sheet of heavy enamel paper 7 x 9.

## Manufacturing and Business.

**J. W. Cain,** formerly Assistant Engineer of Tests of the Atchison, Topeka & Santa Fe, has taken a position with McCord & Co., Chicago.

**The Power Specialty Co.,** New York, has opened a branch office in Philadelphia in the Land Title Building. It is in charge of W. E. Dowd, Jr.

**The H. A. Rogers Company,** 19 John street, New York City, report important orders from the Philippine Islands for railroad construction material and machine shop equipment.

**The Chicago Pneumatic Tool Co.,** Chicago, has received orders from the Chicago, Burlington & Quincy R. R. for 114 Boyer speed recorders, to be applied to new equipment now being received.

**H. S. Brown,** New England Sales Manager of the Power Specialty Co., New York, with offices at 10 Post Office Square, Boston, sailed this week for a short stay in Europe and will return about Nov. 10th.

**C. F. Baker** has been engaged by L. B. Stillwell, Consulting Engineer, as superintendent of power and construction in connection with the engineering and operating contract which Mr. Stillwell has recently made with the United Railways & Electric Company, of Baltimore. Mr. Baker has been President of the American Street Railway Mechanical & Electrical Association, and of the New England Railroad Club, and is a member of the New England Street Railway Club. For many years he was with the West End Street Railway Co., of Boston, and the Boston Elevated, in charge of the construction and operation of power plants and rolling stock.

The partnership between **J. A. L. Waddell** and **Ira G. Hedrick**, under the firm name of Waddell & Hedrick, Consulting Engineers, will be dissolved by mutual agreement on December 31, 1906, notwithstanding the fact that the firm's business has been eminently successful. Mr. Waddell will form a new partnership on January 1, 1907, with John Lyle Harrington, under the firm name of Waddell & Harrington, Consulting Engineers, with offices at Kansas City, Mo. This firm will engage mainly in bridge and structural engineering. Mr. Harrington is at present Chief Engineer of the Locomotive & Machine Company of Montreal. He was formerly engineer of the C. W. Hunt Company, of New York. Mr. Hedrick will open offices as consulting engineer at Kansas City. He will continue in bridge engineering, but will also engage in engineering work in the promotion and development of new railroads and other enterprises.

It is said that probably a greater variety and number of steam shovels has been used in the Missabe iron range of Minnesota in recent years than in any other section of like area in the world. But in the past three or four years the selection has narrowed to two makes. Last year out of a total number of 27 machines for which bids were asked The Marion Steam Shovel Co., Marion, Ohio, supplied 20. Bids were again asked just recently on 28 machines and the entire award was made to this company. The total number finally furnished was one in excess of the original request, or 29 in all, claimed to be the largest single order of steam shovels ever placed. An order also has been received from the Republic Iron & Steel Co. for shovels for use in this same locality. H. S. Kerbaugh, Philadelphia, has bought about 20 Marion shovels during the past year. The company at present ships from 35 to 40 shovels a month and is increasing its facilities for production.

## MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad conventions and engineering societies, see advertising page 24.)

## General Passenger Agents' Association.

The annual meeting of the American Association of General Passenger and Ticket Agents will be held at Atlantic City, N. J., October 16. Following are the principal items of business covered in the announcement: Report of committees on safety paper; reports from co-operating associations—accounting officers, general baggage agents, Canadian ticket agents, and traveling passenger

agents; proposed amendments to constitution; limiting liability on baggage; proposed discontinuance of making sleeping car reservations in advance; proposed adoption of oval or round punch for limiting tickets.

The annual address will be delivered by Mr. John J. Byrne, of the Atchison, Topeka & Santa Fe. There will be a meeting of the Fraternal Society following the regular meeting.

## Freight Traffic Officers.

The American Association of Freight Traffic Officers will hold its annual meeting at the Waldorf-Astoria, New York City, October 17. The President of the Association is D. M. Goodwyn, General Freight Agent of the Louisville & Nashville, and the Chairman of the local committee for the present meeting is Mr. H. B. Walker, Vice-President of the Old Dominion Steamship Company, New York City.

## Railway Signal Association.

In connection with the annual meeting at Washington next week the Secretary announces that the members will be received by President Roosevelt at the White House on Wednesday afternoon, October 17, at 2.30 o'clock.

## ELECTIONS AND APPOINTMENTS.

## Executive, Financial and Legal Officers.

**Lehigh & New England.**—The offices of the General Manager, Chief Engineer and the Assistant Treasurer have been removed from Pen Argyl, Pa., to Bethlehem, Pa.

**McCloud River.**—The offices of the President and the Traffic Manager have been removed from San Francisco, Cal., to Oakland. J. H. Osmer has been appointed Auditor, with office at McCloud, Cal.

**Midland Valley.**—The offices of the General Solicitor and the Auditor have been removed from Fort Smith, Ark., to Muskogee, Ind. T.

**Missouri, Oklahoma & Gulf.**—E. R. Jones has been elected Secretary, with office at Muskogee, Ind. T., succeeding F. T. Taylor.

**Texas & Gulf.**—F. G. Pettibone has been elected President, succeeding N. C. Nixon.

**Tonopah & Goldfield.**—L. J. Lyon has been appointed Auditor, with office at Tonopah, Nev., succeeding W. W. Keith.

**Wisconsin Central.**—W. A. Bradford, Jr., President of the Chicago, Cincinnati & Louisville, has been elected also President and a Director of the Wisconsin Central, succeeding H. A. Whitcomb, resigned. Howard Morris, Vice-President and General Counsel, has resigned. F. H. Dewey has been appointed Assistant to the President. G. W. Webster has been elected Secretary, succeeding C. M. Morris, and R. T. Goodell has been appointed Assistant Secretary, succeeding J. S. Dale. The following Board of Directors has been elected: George M. Cumming, William A. Bradford, Jr., T. L. Chadbourne, Jr., George A. Fernald, John P. Hill, F. H. Dewey, Harry Starr, C. G. Rasmus, Mark T. Cox, William F. Vilas and Fred T. Gates.

## Operating Officers.

**Denver & Rio Grande.**—H. F. Stanley has been appointed Assistant Superintendent of the third division, with office at Salida, Colo., succeeding A. S. Exter.

**East Broad Top.**—E. C. Hall, Assistant to the General Manager, has been appointed to the new office of Superintendent, with office at Orbisonia, Pa.

**Erie.**—A. J. Grymes has been appointed Superintendent of the Marine Department, with office at Jersey City, N. J., succeeding to the duties heretofore performed by C. H. Van Keuren, who was Superintendent of Floating Equipment, and who resigned some months ago. C. R. Stewart has been appointed Assistant Superintendent of the Marine Department, with office at Jersey City.

**Interoceanic of Mexico.**—J. C. Sellsky has been appointed Superintendent of Terminals at Vera Cruz, succeeding H. A. McCulloch.

**Lake Shore & Michigan Southern.**—H. M. Tompkins, who was recently appointed Superintendent at Buffalo, N. Y., was born in 1864 at Galesburg, Ill., and was educated in the public schools of that place. He began railroad work in 1877 as a messenger boy on the Chicago, Burlington & Quincy, and remained on that road until 1904, serving successively as clerk, telegraph operator, car distributor, train despatcher, chief despatcher and trainmaster. He then went to the Lake Shore, and for a year did special work in helping to put in operation a system of handling trains on double track with block signals, and revising the book of rules. Early in 1905 he was appointed Assistant Superintendent at Buffalo, from which position he has now been promoted.

**Lehigh & New England.**—A. S. Wright has been appointed Superintendent of Car Service.



**Mexican Central.**—W. T. East has been appointed Superintendent of Terminals at Tampico, Mex.

**National of Mexico.**—H. H. Allison, Superintendent of Terminals, Mexico City, has been appointed Superintendent at Monterey, succeeding G. P. De Wolf, who takes Mr. Allison's place at Mexico City.

**Rio Grande Western.**—B. A. Campbell has been appointed Assistant Superintendent, with office at Salt Lake City, Utah.

**Southern.**—A. P. Cone has been appointed Assistant Superintendent of the Washington division, with office at Alexandria, Va.

**Ulster & Delaware.**—R. O'Sullivan, roadmaster, has been appointed Assistant General Superintendent.

#### Traffic Officers.

**Birmingham Belt.**—E. T. Willcox has been appointed General Freight Agent, with office at Birmingham, Ala.

**Florida West Shore.**—C. R. Capps has been appointed General Freight Agent.

**Missouri, Kansas & Texas of Texas.**—E. S. Briggs has been appointed Assistant General Freight Agent, with office at Houston, Tex., succeeding T. Noel.

**New York Central & Hudson River.**—William L. Kingman, who was recently appointed Industrial Agent, was born in New York State in 1842 and educated at Owego (N. Y.) Academy. He began railroad work in 1860 as a freight clerk on the New York & Erie, now part of the Erie. After working up in this department, he went in 1872 to the auditing department and next year was made station agent at Elmira, N. Y. After being manager of the McIntyre Coal Co., at that place, he was made in 1878 General Coal Agent of the New York Central. He was appointed Assistant General Freight Agent of this road in 1893 and General Freight Agent in 1895, which he held until his recent appointment.

#### Engineering and Rolling Stock Officers.

**Cleveland, Cincinnati, Chicago & St. Louis.**—George Crocker has been appointed Division Engineer in charge of construction on the Cincinnati division, with office at Middletown, O., succeeding H. P. Delano, resigned.

**Colorado Midland.**—R. Griffith has been appointed Master Mechanic, with office at Colorado City, Colo., succeeding to the duties heretofore performed by W. J. Schlacks, who has resigned.

**El Paso & Southwestern.**—The office of the Superintendent of Motive Power has been removed from Douglas, Ariz., to El Paso, Tex.

**Evansville & Terre Haute.**—J. W. Hunter has been appointed Division Engineer at Evansville, Ind.

**Lehigh Valley.**—H. W. Lewis, Supervisor of Signals at Easton, Pa., has been appointed Signal Engineer, with office at South Bethlehem, Pa., succeeding C. C. Rosenberg, resigned.

**McCloud River.**—J. Kennedy has been appointed Master Mechanic, with office at McCloud, Cal.

**Mexican Central.**—F. J. Lass has been appointed Acting Mechanical Engineer, succeeding C. T. Bayless, deceased. C. F. Roberts, General Foreman at Monterey, has been appointed Master Mechanic at Cardenas, succeeding J. J. Cavanaugh, resigned.

**Michigan Central.**—G. H. Harris, Division Engineer at Niles, Mich., has been appointed Assistant Engineer, with office at Detroit, Mich. Mr. Harris will assist the Assistant Chief Engineer. C. C. Hill succeeds Mr. Harris.

**National of Mexico.**—M. J. Schneider has been appointed Superintendent of Motive Power, with office at Laredo, Tex., succeeding James Farrell.

**Rio Grande Junction.**—W. A. Whitney has been appointed Superintendent, with office at Grand Junction, Colo., succeeding W. G. Choate, resigned.

**Tennessee Railroad.**—J. F. Ashworth has been appointed Master Mechanic.

**Yazoo & Mississippi Valley.**—M. H. Hovey has been appointed Signal Engineer, with office at Chicago, Ill., succeeding W. A. D. Short, resigned.

#### Purchasing Agents.

**Georgia Southern & Florida.**—W. P. Harper has been appointed Purchasing Agent, with office at Macon, Ga.

**Tonopah & Goldfield.**—J. H. Kuhns has been appointed Purchasing Agent, with office at Tonopah, Nev.

#### LOCOMOTIVE BUILDING.

The Buffalo, Rochester & Pittsburg denies having recently ordered any heavy locomotives for freight and passenger service.

The Charlotte Harbor & Northern has ordered from the Baldwin Locomotive Works for December, 1906, delivery one simple ten-wheeler (4-6-0) and one simple consolidation (2-8-0) locomotive. The consolidation locomotive is to have cylinders 20 in. x 24 in. and the ten-wheeler, 18 in. x 24 in.

The Chicago, Milwaukee & St. Paul is building 18 ten-wheel passenger (4-6-0) locomotives and 15 freight locomotives at its West Milwaukee shops. The specifications are as follows:

General Dimensions.		
Type of locomotive	Ten-wheel.	Freight.
Weight, total	178,000 lbs.	177,000 lbs.
Weight, on drivers	131,000 lbs.	136,000 lbs.
Cylinders	20 1/2 in. x 26 in.	21 in. x 30 in.
Boiler, wkg steam pressure	200 lbs.	200 lbs.
" number of tubes	300	350
" diameter of tubes	2 in.	2 in.
" length of tubes	15 ft.	15 ft.
Firebox, length	8 ft. 11 1/2 in.	9 ft. 11 1/2 in.
" width	3 ft. 5 1/2 in.	3 ft. 5 1/2 in.
" grate area	30.3 sq. ft.	34.16 sq. ft.
Heating surface, total	2,538.0 sq. ft.	2,919.0 sq. ft.
Tank capacity	7,000 gals.	7,000 gals.
Coal capacity	10 tons.	10 tons.

The Bangor & Aroostook has ordered from the American Locomotive Co. three simple ten-wheel (4-6-0) locomotives. The specifications are as follows:

Weight on drivers	113,000 lbs.
Total weight	146,000 lbs.
Diameter of cylinders	20 in.
Stroke of pistons	26 in.
Diameter of drivers	36 in.
Type of boiler	Extended wagon top
Working steam pressure	180 lbs.
Heating surface, total	2,052 sq. ft.
Tubes, number	277
" outside diameter	2 in.
" length	13 ft. 8 in.
Firebox, length	96 in.
" width	41 in.
Grate area	27 1/2 sq. ft.
Tank capacity for water	4,000 gals.
Coal capacity	7 tons

#### Special Equipment.

Air brakes	Westinghouse
Brake beams	Sterlingworth
Couplers	Tower
Headlights	Dewey
Sanding devices	Leach
Steam heat equipment (one engine)	Consolidated Car Hfg. Co.
Tires, driving wheel	Midvale

The Canadian Pacific, as reported in our issue of Sept. 28, has ordered 30 simple superheater ten-wheel (4-6-0) locomotives and 20 simple superheater consolidation (2-8-0) locomotives from the Locomotive & Machine Co., of Montreal. The ten-wheel locomotives are for December, January and February delivery. The specifications are as follows:

General Dimensions.		
Type of locomotive	Ten-wheel.	Consolidation.
Weight, total	190,000 lbs.	186,200 lbs.
Weight, on drivers	141,000 lbs.	163,700 lbs.
Diameter of drivers	63 in.	58 in.
Cylinders	22 1/2 in. x 28 in.	22 1/2 in. x 28 in.
Boiler, type	Radial stay wagon top.	Radial stay wagon top.
" wkg steam pressure	175 lbs.	175 lbs.
" No. of tubes	240 2-in. and 24 5-in.	240 2-in. and 24 5-in.
" length of tubes	14 ft. 4 in.	14 ft. 2 1/2 in.
Firebox, length	102 1/2 in.	96 3/4 in.
" width	69 1/2 in.	65 1/4 in.
" material		Otis.
" grate area	49 sq. ft.	43 sq. ft.
Heating surface, total	2,413 sq. ft.	2,216 sq. ft.
Tank capacity	5,000 Imperial gals.	5,000 Imperial gals.
Coal capacity	10 tons.	10 tons.

#### Special Equipment.

Air brakes	Westinghouse
Axles	Peech & Lozer (steel)
Bell ringer	"Little Giant"
Boiler lagging	Sectional magnesite
Brake-beams	Simplex
Brake-shoes	Canadian Pacific standard
Couplers	Washburn and Tower
Headlights	Pyle-National
Injector	Hancock
Journal bearings	Canadian Pacific standard
Piston rod packings	Lewis & Kunzer's
Valve rod packings	Lewis & Kunzer's
Safety valve	World brand
Sanding devices	Leach
Sight-feed lubricators	Detroit
Springs	Canadian Pacific standard
Steam gages	Star
Steam heat equipment	Gould
Other specialties	Vaughan-Horsley super-heater

The Intercolonial has ordered two simple ten-wheel (4-6-0) passenger locomotives from the Canadian Locomotive Co., Ltd. The specifications are as follows:

Weight, total	87,500 lbs.
Weight on drivers	75,500 lbs.
Dimension of cylinders	16 1/2 in.
Stroke of pistons	22 in.
Diameter of drivers	37 in.
Boiler, type	Extended wagon top
" working steam pressure	200 lbs.
" number of tubes	200
Tubes, material	Charcoal iron
" outside diameter	1 3/4 in.
" length	12 ft.
Firebox, material	S. F. B. steel
Tank capacity	3,000 gals.
Coal capacity	5 tons

*Special Equipment.*

Air brakes	Westinghouse
Axles	Hammered steel
Bell ringer	Automatic
Boiler lagging	Asbestos
Brake-beams	Simplex
Injector	Hancock
Journal bearings	Ajax
Piston rod packings	W. S. metallic
Valve rod packings	W. S. metallic
Safety valve	Coale
Sanding devices	Wilson's
Sight-feed lubricators	Detroit
Sp. lugs	Cruible cast-steel
Steam heat equipment	Safety Car Htg. & Lighting Co.
Other specialties	Elvin grease cups

The Mexico, Oaxaca & Yucatan has ordered from the Baldwin Locomotive Works 60 ten-wheel (4-6-0) locomotives, 40 consolidation (2-8-0) locomotives, and four switching locomotives. All locomotives are to be oil burning, and the ten-wheelers and the consolidation engines are for December, 1907, delivery. The special equipment is the same for all classes. The specifications are as follows:

	Consolidation.	Ten Wheel.
Weight on drivers	173,000 lbs.	126,000 lbs.
" total	195,000 lbs.	168,000 lbs.
Diam. of cylinders	22 in.	20 in.
Stroke of pistons	28 in.	28 in.
Diam. of drivers	57 in.	63 in.
Type of boiler	Straight top	Extended wagon top
Working steam pressure	200 lbs.	200 lbs.
Heating surface—total	3,162 sq. ft.	2,766 sq. ft.
Tubes—number	321	360
" material	Charcoal iron	Charcoal iron
" outside diam.	2 1/4 in.	2 in.
" length	16 ft.	14 ft.
Firebox, length	108 in.	102 in.
" width	66 in.	66 in.
" material	Homogeneous steel	Homogeneous steel
Grate area	58 1/2 sq. ft.	46 1/10 sq. ft.
Tank capacity, water	6,000 gal.	5,000 gal.
Oil capacity	5,000 gal.	4,500 gal.

Total weight	113,000 lbs.	Switching.
Diameter of cylinders	19 in.	
Stroke of pistons	24 in.	
Diameter of drivers	52 in.	
Type of boiler	Straight top	
Working steam pressure	180 lbs.	
Heating surface—total	1,451 1/10 sq. ft.	
Tubes—number	229	
" material	Charcoal iron	
" outside diameter	2 in.	
" length	11 ft. 1 in.	
Firebox—length	91 1/4 in.	
" width	41 in.	
" material	Homogeneous steel	
Grate area	25 1/2 sq. ft.	
Tank capacity for water	4,000 gal.	

*Special Equipment.*

Air brakes	Westinghouse
Axles	Hammered steel
Brake beams	Buffalo-Vanderbilt
Couplers	Tower
Headlights	Pyle-National
Injector	Hancock
Piston rod packings	W. S. Metallic Packing Co.
Safety valve	Ashton
Sanding devices	Leach
Sight-feed lubricators	Detroit
Springs	Baldwin standard
Steam gages	Ashcroft
Steam heat equipment	None
Tires, driving wheel	Baldwin standard
" truck wheel	Baldwin standard
" tender wheel	Baldwin standard
Wheel centers	Cast iron

**CAR BUILDING.**

The Seaboard Air Line is in the market for 1,000 box cars and 1,000 gondolas.

The Northern Pacific is reported as in the market for about 160 passenger cars.

The Mobile, Jackson & Kansas City has ordered 20 flat cars from the Western Steel Car Co.

The St. Louis Southwestern contemplates building about 450 cars at its Pine Bluff (Ark.) shops.

The Boston & Maine has ordered 500 box cars of 60,000 lbs. capacity from the Western Steel Car Co.

The Buffalo & Susquehanna has bought 500 steel gondola cars of 100,000 lbs. capacity each with six drop doors.

The Canadian Pacific is building 3,000 additional box cars of 60,000 lbs. capacity at its Angus shops exactly like the 1,118 box cars reported in our issue of October 5.

The Grand Trunk has ordered 1,000 self-clearing steel hopper bottom coal cars of 100,000 lbs. capacity from the Pressed Steel Car Co., for March and April, 1907, delivery.

The Hudson Companies, 111 Broadway, New York, have ordered 50 steel passenger cars from the American Car & Foundry Co. for delivery early next spring. An additional order for 150 cars will be given later.

The Lake Superior & Ishpeming has ordered 100 steel ore cars from the Pressed Steel Car Co., which are the same design as those

ordered by the Marquette & Southeastern, specifications for which were published in our issue of Sept. 28.

The Pere Marquette has ordered from the Pullman Co. 2,000 box cars of 80,000 lbs. capacity; this is in addition to the order for 2,000 similar cars given to the same company last April.

The Charlotte Harbor & Northern has ordered from Barney & Smith, for December, 1906, delivery, one day coach and one combination passenger and baggage coach to be built at Dayton, Ohio. Bodies and underframes will be of wood.

The Chicago, Rock Island & Pacific is reported to be in the market for a large number of passenger cars, and has ordered 2,000 box, 400 furniture, 300 flat, 250 stock and 250 coal cars and 50 cabooses from the American Car & Foundry Co.; 650 National coal dump cars from the National Coal Dump Car Co., and 100 Hart convertible ballast cars from the Rodger Ballast Car Co.

The Minneapolis, St. Paul & Sault Ste. Marie has ordered 1,000 box cars of 60,000 lbs. capacity, 200 flat cars of 60,000 lbs. capacity, and 25 cabooses, as reported in our issue of Sept. 28, from the American Car & Foundry Co. The box cars will weigh 34,000 lbs. and measure 34 ft. 4 in. long, 8 ft. 4 in. wide and 8 ft. high, inside measurements. The flat cars will be 40 ft. long and 8 ft. 6 in. wide, outside measurements. The cabooses will weigh 24,000 lbs. and measure 31 ft. 4 in. long and 9 ft. wide, over all. The special equipment for all includes:

Bolsters	Common Sense
Brake-beams	Simplex
Brake-shoes	Walsh
Brakes	Westinghouse
Brasses	National-Fulton
Draft rigging	Miner
Journal boxes	McCord
Springs	Simplex

The Atchison, Topeka & Santa Fe has ordered 2,500 box cars of 70,000 lbs. capacity from the Standard Steel Car Co., for April, May and June, 1907, delivery; 1,600 gondolas of 100,000 lbs. capacity, 500 refrigerator cars of 60,000 lbs. capacity, 500 stock cars of 70,000 lbs. capacity, and 400 ballast cars of 100,000 lbs. capacity from the American Car & Foundry Co. The gondolas to be delivered from February to June, 1907, and the refrigerator cars for December delivery. The Atchison has also ordered 21 first class coaches, 20 chair cars and 20 smoking cars from the Pullman Co. for April and May, 1907, delivery. The box cars will weigh 38,000 lbs. and measure 36 ft. long, 8 ft. 6 in. wide, and 8 ft. high, inside measurements. The gondolas will weigh 44,000 lbs. and will measure 40 ft. long, 9 ft. 3 1/2 in. wide and 4 ft. 7 1/4 in. high, inside measurement. The refrigerator cars will weigh 60,000 lbs., and will measure 32 ft. 6 in. long, 8 ft. 2 3/4 in. wide and 7 ft. 3 3/4 in. high, inside measurements. The stock cars will weigh 46,000 lbs. and will measure 40 ft. long, 8 ft. 8 in. wide and 7 ft. 9 in. high, inside measurements. The ballast cars will weigh 45,500 lbs. and will measure 41 ft. 6 in. long, 10 ft. 3 1/2 in. wide, and 9 ft. 10 in. high over all. The first class coaches will weigh 116,000 lbs. and will measure 70 ft. long, 10 ft. wide and 6 ft. 9 1/2 in. high, inside measurements. The chair cars will weigh 113,000 lbs. and will measure 69 ft. 4 in. long, 10 ft. wide and 6 ft. 9 1/2 in. high, inside measurements. The smoking cars will weigh 111,700 lbs. and will measure 69 ft. 2 in. long, 9 ft. 1 in. wide and 6 ft. 9 in. high, inside measurements. The special equipment for all cars includes:

Axles	Cambria Steel Co.
Bolsters	American Steel Foundry
Brake-beams	Kewanee & National Hollow
Brake-shoes	(Passenger cars) Diamond special
Brakes	Westinghouse
Brasses	Hewitt Mfg. Co.
Couplers	(Passenger cars) Janney; (Freight cars) National
Curtain fixtures	Forsyth
Curtain material	Pantastote
Door fastenings	Security (for box cars)
Draft rigging	Miner
Dust guards	Soule
Heading System	Pullman
Journal boxes	Symington (for passenger cars)
Journal boxes	McCord (for freight cars)
Springs	Simplex Appliance Co.
Trucks	Pullman
Wheels	Standard Steel Wks. (for passenger)
Wheels	Griffin (for freight)

The Harriman Lines have ordered 113 coaches for the Union Pacific, the Oregon Short Line, the Oregon Railroad & Navigation, the Southern Pacific, the Galveston, Harrisburg & San Antonio, Morgan's Louisiana & Texas, the Louisiana Western and the Cananea, Yaqui River & Pacific; five chair cars for the Oregon Short Line, two postal cars for the old Oregon and California, and 12 mail and baggage cars for the Oregon Short Line and the Cananea, Yaqui River & Pacific, all from the St. Louis Car Co., for delivery beginning February 1, 1907; 29 baggage cars for the Oregon Short Line, the Oregon Railroad & Navigation, the Oregon & California, the Southern Pacific, the Cananea, Yaqui River & Pacific, the Maricopa & Phoenix, Salt River Valley from Harlan & Hollingsworth, for January, 1907, delivery. The coaches and chair cars will weigh 88,000 lbs. and will measure 60 ft. long, 9 ft. 8 in. wide and 14 ft. 1 1/10 in. high, over all. The postal cars will weigh 101,500 lbs. and will measure 60 ft. 7 1/4 in. long, 9 ft. 8 in. wide and 14 ft. 1 1/10

in. high, over all. Seven of the mail and baggage cars will measure 60 ft. long, and five will measure 69 ft. long. The baggage cars will weigh 85,000 lbs. and will measure 68 ft.  $\frac{1}{2}$  in. long and 9 ft.  $\frac{3}{4}$  in. wide, inside measurements. The special equipment includes:

Brake-shoes .....	American Brake-Shoe & Foundry
Couplers .....	McConway & Torley
Curtain material (coaches and chair cars) .....	Pantasote
Draft rigging .....	Sessions
Heating System .....	Consolidated Car Heating Co.
Journal boxes .....	National Malleable Castings Co.
Lighting .....	Safety Car Heating & Lighting Co.
Platforms .....	Standard Coupler Co.
Springs .....	Railway Steel Spring Co.
Vestibules .....	Pullman
Wheels .....	Standard Steel Works

#### RAILROAD STRUCTURES.

ATLANTA, GA.—Temporary shops are to be put up here by the Western & Atlantic to replace the buildings recently destroyed by fire. Plans are being considered for permanent structures to cost about \$250,000.

CHICAGO, ILL.—The Chicago & North-Western is to build a new terminal station at Chicago. It will be on the West Side, between Madison, Lake, Canal and Clinton streets. Work will begin early next spring and be pushed to completion so as to have the station in service within two years.

NORFOLK, VA.—Preliminary plans for the Tidewater Railway's new coal pier at Sewell's Point are about completed. It will be 1,370 ft. long with a maximum height of 82 ft. at low water, eight feet higher than the Lambert's Point piers, which are about 860 ft. long.

OMAHA, NEB.—The Union Pacific, it is said, has given a contract for additional car shops here to consist of a main building of 300 x 600 ft. with an addition of 300 x 200 ft.

OSWEGO, N. Y.—The New York Central & Hudson River has asked bids for putting up a new passenger station at West First and Utica streets.

SCRANTON, PA.—The Delaware, Lackawanna & Western is making plans for putting up a new passenger station at Platt Place and Lackawanna avenue.

TOLEDO, OHIO.—The new freight house which the Lake Shore & Michigan Southern is to build on the middle grounds will be 800 ft. long.

VERA CRUZ, MEXICO.—The preliminary surveys are being made for the proposed Union Terminal Station at this place. The several railroads have formed the Vera Cruz Terminal Company. Modern facilities for the prompt loading and discharging of vessels are also to be provided. The upper part of the passenger station is to be utilized as a hotel, with a frontage facing the Gulf. The plans now being prepared are to be presented to the Government for its approval within four months, and it is expected that work is to commence immediately thereafter.

#### RAILROAD CONSTRUCTION.

##### New Incorporations, Surveys, Etc.

ALABAMA CITY, GADSDEN & ATTALA (ELECTRIC).—A meeting of the shareholders of this road is to be held October 15th to vote on the authorization of a new mortgage to secure funds, part of which will be used for extending the line from Gadsden, Ala., to Noccalula Falls, five miles. The company at present owns 11 miles of road, connecting Gadsden, Attala, Alabama City and Black Creek Falls Park.

BESSEMER & LAKE ERIE.—The Western Allegheny branch of this road has been extended from East Brady west to Newcastle, about five miles. (July 13, p. 10.)

BROOKVILLE & MAHONING.—See Pittsburg, Shawmut & Northern.

CANADIAN NORTHERN.—Work, it is said, has been started by this company on a branch line from Dalmeny to Coulter, Man., 45 miles.

CANADIAN PACIFIC.—This company is said to be back of a project to build a line from Gretna northwest to Portage la Prairie, Man., about 80 miles.

CHICAGO, ROCK ISLAND & PACIFIC.—The report of this company for the year ending June 30, 1906, shows that it had a total length of road of 7,426.26 miles, and that the average mileage operated was 7,218.07. Changes in operated mileage during the year by the acquirement of trackage rights, changes in alinement and the construction of a branch from Lehigh Junction to Lehigh, Indian Territory, 6.54 miles, made a total increase of 220.92 miles. The company has under construction on the Chicago, Rock Island & Pacific 12.73 miles between Haileyville, Indian Territory, and Wilburton, and on the Chicago, Rock Island & El Paso from the Texas-New Mexico

boundary to Tucumcari, N. Mex., 41.12 miles, but on this no work had been done during the year; on the Chicago, Rock Island & Gulf from Amarillo, Tex., to the Mexican boundary, 69.87 miles, no work done during the past year; on the Rock Island, Arkansas & Louisiana active work is in progress from Haskell, Ark., which is 3.58 miles north of Traskwood, on the Hot Springs branch, to Eldorado, 100.78 miles, and on a branch from Tinsman to Crossett, 42.75 miles, a total of 143.53 miles, about one-third, 50.75 miles from Haskell, which is the north end of the line, to Fordyce, is now in operation. Surveys have been made for a line from Alexandria, La., to Eunice, 56.10 miles. On this construction work is to be pushed, making a total of 272.60 miles now under construction.

According to reports from Kansas City, this company is planning to make continuous freight yards from Twelfth and Mulberry streets across the Kaw river through Armourdale to a point north of the Procter & Gamble Soap Works. To carry out these improvements, the company has bought land along the right of way in Armourdale. A bridge has been built across the Kaw river, and the company has authorized an expenditure of about \$500,000 for additional improvements. The present roundhouse and yards are to be removed to make room for tracks and a new building. The plans provide for the building of 39 miles of yard tracks, making a total in the Kansas City terminals of 80 miles of track, with an approximate capacity of 6,000 cars. The work requires the filling in of about 400,000 cubic yards of earth before the tracks can be laid. The plans include yards to be used for inbound freight west of the present Rock Island Junction at Twelfth street in Armourdale. The outbound freight yards will extend from Fourth to Twelfth streets in Armourdale, and the new yards for passenger trains will be in the west end of Armourdale. In the city freight yards between Belt and Genesee streets, extending south from Twelfth to Sixteenth streets, team tracks, to have a capacity for 150 cars, are to be laid. There is also to be a 30-stall brick roundhouse, a gravity coal chute of 350 tons capacity, water plant for purifying water for engines, an ice house and two large shops each for repair work.

COEUR D'ALENE & SPOKANE.—A new division, called the Hayden Lake division, has been opened for business from Coeur d'Alene, Idaho, to Hayden Lake, seven miles. (Aug. 17, p. 44.)

COLORADO-UTAH SOUTHWESTERN.—Incorporated in Colorado to build a line from Grand county, Colorado, west to Salt Lake City. Connection is to be made with the Denver, Northwestern & Pacific. The names of the incorporators are not given.

COUNCIL BLUFFS, TABER & SOUTHERN (ELECTRIC).—W. J. Dobbs, of Taber, Iowa, President of this company, and F. M. Clarke, Treasurer of the Omaha Commercial Club, are negotiating for \$2,000,000 capital for this proposed electric line to be built from Omaha, Neb., to Tarkio, Mo. Favorable reports have been made by Engineer S. W. Craig on his examination of the proposed line from Council Bluffs to Tarkio, and on a branch to Hornbury, Ia., a total distance of 76 miles.

EL PASO & SOUTHWESTERN SYSTEM.—According to reports from New Mexico plans are being made to build a line from Corona, on the El Paso & Rock Island north via Encino and Las Vegas, Mex. Chas. Henning is the Engineer in charge of locating the new line, which is to be about 200 miles long.

GRAND TRUNK PACIFIC.—Surveys, it is said, are being made by this company for building a line across Vancouver Island.

Bids will be asked next month by P. E. Ryan, Ottawa, for building about 500 miles in eastern Canada as follows: Superior Junction, eastward; La Toque, westward; Quebec, eastward, and 200 miles east and west of Lake Abittibi.

HUDSON COMPANIES.—The contract for the Sixth avenue subway extension from the Hudson River Tunnel at Twelfth street and Sixth avenue, under Sixth avenue to Sixth avenue and Thirty-third street, New York City, about one mile, has been let to the Degnon Contracting Company. The work, which is to be started at once, includes the excavation of about 200,000 cubic yards, and must be completed within two years.

KANSAS CITY, LAWTON & PACIFIC.—G. E. A. Hill, Assistant General Manager, is quoted as saying that contracts have been let for building the Hampton and Wewoka section of the Grand River and Lawton division, and that work will shortly be started. Surveys are being made and rights of way secured. (Aug. 10, p. 38.)

KANSAS CITY, MEXICO & ORIENT.—This company has extended the Chihuahua division from a point south of Bocayne, Mexico, to Agnatos, 4.3 miles.

LAKE SHORE & MICHIGAN SOUTHERN.—The four-tracking of this road from Buffalo to the east end of the Dunkirk yard has been completed.

LOUISIANA & PINE BLUFF.—This road has been opened for business from Huttig, Ark., to Dallas Junction, 2.5 miles. Connection is to be made at the latter point with the Eldorado & Bostrop, and



at Huttig with the Farmerville & Southern and the Little Rock & Monroe.

**MEXICAN CENTRAL.**—The concession granted in the interest of the Mexican Central last May to build a number of branch lines from Cuernavaca on the Mexican Central has been amended, so as to permit the building of a line from Zacatepec, on the Cuernavaca division of the Mexican Central, to Jojutla and Tlaltenango, in the state of Morelos; also to build a number of short branches from the main line in this district. Five miles must be completed by May, 1907, and the entire line and branches completed within three years.

The Saltillo branch of the Monterey division of this road, extending from Paredon south to Saltillo, 44.7 miles, was formally opened for regular service on September 2d. Passenger trains will run from Saltillo through Monterey, and the line will compete for passenger traffic with the Mexican National between these points. Connections will also be made with the Tampico lines of the Mexican Central and with the Coahuila & Pacific, which is owned by this company.

**MEXICAN ROADS.**—Vice-Consul J. H. Brickwood, of Nogales, reports a new railroad project in the Sonora district, of which he says: A projected railroad in this district will open up a valuable mining territory hitherto inaccessible except by wagon trains. As originally intended, the new road was to be built from Port Lobos, on the Sonora side of the gulf of California, northeast to Caborca, about 50 miles, concessions for which had been obtained. After surveys had been made it was determined to extend the line 150 miles farther in the same direction to Tucson, Ariz., crossing the boundary line at a point near the junction of the Altar and Magdalena districts. A concession has recently been granted by the Mexican Government for the strip from Caborca to the boundary line. Surveys from the gulf port to Caborca have been completed and work on that section will begin early in November. Surveys between Caborca, Sonora and Tucson, Ariz., will be started shortly, and will be pushed through. As soon as practicable construction work will begin, and every effort made to have the new line between the Gulf and Tucson, Ariz., completed at an early date.

A concession has been granted to Ricardo Crombe for building a line from Culiacan, state of Sinaloa, to Tepehuanes, in the state of Durango, about 100 miles, giving the former place direct rail connection with the Mexican International. The terms of the concession require that six months after its date surveys must be completed for 20 miles, and within 18 months the road must be completed for a similar distance.

**MEXICO, OAXACA & YUCATAN.**—See article on the construction of this road on page 94, General News Section.

**NEW ORLEANS GREAT NORTHERN.**—This company, on August 1, began operating trains into New Orleans over the tracks of the New Orleans & North-eastern.

The company has opened for business a new branch from Flor-  
enville Junction, La., north to Bogalusa, 26 miles.

**NORFOLK & SOUTHERN.**—A meeting is to be held October 16th of the stockholders of this road and the Virginia & Carolina Coast to vote on a proposition to increase the capital stock from \$2,000,000 to \$3,000,000, to secure funds for an extension of the road from Edenton, N. C., to a point near the northwestern boundary of that state; to authorize to sell to the Atlantic & North Carolina Co. the Pamlico, Oriental & Western; and to sell to the John L. Roper Lumber Co. a portion of the Virginia & Carolina Coast line south of Winthrop, N. C. (May 11, p. 143.)

**NORTHERN PACIFIC.**—On the extension being built by this road from Grangeville to Cul de Sac, Idaho, 55 miles, grading has been completed for 15 miles.

**OREGON ELECTRIC RAILWAYS.**—This company, which was incorporated in Oregon last spring with a capital of \$2,500,000, is building an electric line from Portland south to Salem, 50 miles. It is expected to have the line in operation by July, 1907. The financing of the road has been carried out by Moffat & White, of New York. The company controls the Willamette Valley Traction Co.

**OTSELIC VALLEY.**—Incorporated in New York with \$120,000 capital, and office at South Otselic. The promoters of this company propose to build a line from South Otselic, Chenango County, New York, northeast to Georgetown Station, in Madison County, on the West Shore, 12 miles. The directors include B. F. Gladding, M. K. Perkins, D. W. Crumb, E. J. Stack and R. R. Brown, all of South Otselic.

**OVERTON COUNTY.**—According to reports from Tennessee, this company, which operates 19 miles of road in Tennessee, is to build an extension from its present northern terminus at Livingston north to Burnside, Ky., about 60 miles, where a connection is to be made with the Cincinnati, New Orleans & Texas Pacific. Work is to be started at once.

**PITTSBURG, SHAWMUT & NORTHERN.**—A contract has been given by this company to the Miller Construction Co., of Lockhaven, Pa.,

for building part of the Brookville & Mahoning from Hydes, Pa., southwest to Knoxdale, 36 miles. The line is to connect Elk county with Pittsburgh. Additional contracts for the section from Knoxdale to Freeport, about 65 miles, are to be let early next year. W. W. Henshey, Chief Engineer, with offices at Brookville, says that surveys for the entire line have been completed, and that it will pass through Brockwayville, Allen's Mills, Brookville, Knoxdale, Kittanning and Ford City. Grading has been started between Brookville and Knoxdale, but work will not be started on the southern end until next year. (See Construction Record.)

**SALEM-MEHAMA (ELECTRIC).**—Surveys, it is said, have been completed and part of the right of way secured for building an electric line from Salem, Oregon, southeast via Turner and Stayton to Mehama, about 35 miles. The project is backed by residents of Stayton.

**SAN FRANCISCO, IDAHO & MONTANA.**—It is said that James J. Hill has bought all the rights of this projected road, for which E. H. Harriman was reported to be negotiating. Surveys from Butte to Boise and to San Francisco have been completed. (June 8, p. 168.)

**SEABOARD AIR LINE.**—The Tallahassee, Perry & Southeastern has been extended from Wacissa, Fla., east to Covington, 11 miles.

**SIERRA PACIFIC.**—An officer writes that this company was recently organized in California with a capital of \$5,000,000, which shortly is to be increased. The principal promoter is Otto E. Bashore, 326 Main street, Porterville, Tulare County, Cal., who is President of the company. J. W. Davis is First Vice-President; C. B. Reas, Second Vice-President, and T. A. Howeth, Secretary, all of Porterville, and R. Linder, of Tulare, Treasurer. The other directors are George D. Avery and F. Ackerman, of Porterville; L. E. McCabe, of Visalia; J. H. Stufflebeem, Kern City; C. E. Henley, Globe, and F. A. Dodge, of Hanford. L. E. McCabe, of Visalia, is Chief Engineer, and A. M. Robertson, of Tulare, Deputy Chief Engineer. It is proposed to use steam locomotives on 250 miles of the road and electricity for about 30 miles over the steeper grades. The total length of the road is to be 280 miles, with several branches. The proposed main line is from Globe, Tulare County, which is to be the eastern terminus, southwest through Success and Worth to Plano and Porterville, and thence northwest via Woodville and Tulare to Tagus; thence west via Hanford, Armona, Lemoore and Huron to Coalinga, northwest of which point the line crosses the Coast Range mountains; thence south via Paso Robles, Templeton, Santa Margarita and San Luis Obispo to the western terminus at Port Hanford on San Luis Obispo Bay, approximately 193 miles from Globe. One branch is to be run from Tagus northeast to Visalia, thence northwest via Reedley, Orosi and Sanger to Fresno, 70 miles; and one from Tagus south to Bakerfield, about 60 miles. A contract for grading has been let and work is to be started at once. Bids are wanted for track laying, also for rails, etc., and for bridges. The grading will not be difficult. There will be needed about ten small bridges and two steel ones. (Sept. 21, p. 76.)

**SOUTH & WESTERN.**—This road has been extended from Spruce Pine, N. C., south to Altapass, four miles.

**TALLAHASSEE, PERRY & SOUTHEASTERN.**—See Seaboard Air Line.

**TEHUANTEPEC NATIONAL.**—A concession was granted in August to S. Pearson & Son, Ltd., of London, for building a line from a point on the Tehuantepec road to Minatitlan, about 10 miles. The road will practically be a branch of the Tehuantepec and will reach oil fields recently discovered in the neighborhood of Minatitlan.

**TEXAS TRACTION.**—Incorporated in Texas with \$3,000,000 capital to build an electric line from Dallas to Sherman and to operate street railways in these cities. The incorporators include: Frank H. Proctor, Boston; W. R. Brents of Grayson county, F. A. Jones of Harris county, and J. F. Strickland, D. A. Templeton and J. N. Simpson, of Dallas.

**TREMONT & GULF.**—This road has been opened for business from Chathamville south via Jonesboro Junction to Pyburn Junction, La., 26 miles; also on branches west from Jonesboro Junction to Jonesboro, about 20 miles, and from Pyburn Junction to Dobson, La., about 10 miles.

**UNION PACIFIC.**—Engineers of this company are reported to have finished surveys for a cut-off from Laramie, Wyo., south to Platteville, Colo., about 90 miles, on the Denver-Cheyenne line of the Union Pacific. The right of way has been partially secured. The new line will shorten the distance from Denver to Ogden on the Union Pacific and eliminate the heavy grades between Cheyenne and Denver.

**WABASH.**—The improvements on this road to be provided for by the bond issue at the special meeting of stockholders in Toledo, on October 22, include the double-tracking of the line between St. Louis and Chicago. Only 30 miles of the road is now double-tracked, principally between Decatur and St. Louis. Work is in progress between Decatur and Taylorville, Ill., and when this is completed next spring there will be 80 miles of double track. The double-

track work will be continued during the next two or three years, those parts of the line where traffic is heaviest receiving the first consideration. As the double-tracking progresses other improvements will be carried out to make the expansion uniform. The next piece of double-tracking will probably be between Taylorville and Litchfield, Ill.

**WESTERN ALLEGHENY.**—See Bessemer & Lake Erie.

**YOSEMITE VALLEY.**—This road, which operates a line from Merced, Cal., on the Atchison, Topeka & Santa Fe and the Southern Pacific northeast to Merced Falls, 24 miles, has been extended from Merced Falls to Pleasant Valley, 13 miles.

#### RAILROAD CORPORATION NEWS.

**ALABAMA NORTHERN.**—See Atlanta, Birmingham & Atlantic.

**ATLANTA, BIRMINGHAM & ATLANTIC.**—This company has acquired the Eastern of Alabama and Alabama Northern, and now operates them as its Alabama division; both roads have hitherto been operated under lease by the Louisville & Nashville. The Eastern of Alabama runs from Stockdale, Ala., to Pyriton, 20 miles; the Alabama Northern runs from Pyriton to Ashland, 7 miles.

**CANADIAN PACIFIC.**—At the annual meeting, the stockholders authorized an issue of 4 per cent. debenture stock, the proceeds of which are to be used for the building of branch lines in the West, and the leasing of about 170 miles of road in Ontario and Quebec owned by the Georgian Bay & Seaboard, the Walkerton & Lucknow, the Berlin, Waterloo & Lake Huron and the Joliet & Brandon.

**CHATTANOOGA SOUTHERN.**—See Louisville & Nashville.

**EASTERN OF ALABAMA.**—See Atlanta, Birmingham & Atlantic.

**GRAY'S POINT TERMINAL.**—See St. Louis Southwestern.

**GREAT NORTHERN.**—The long-expected consummation of the "ore deal" was on October 5 announced by the chairman of the Board of Directors of the United States Steel Corporation, in the following statement:

After long negotiations a contract has been signed for the acquisition on a royalty basis of the Hill ore properties (so-called) by companies controlled by the United States Steel Corporation. The quantity of ore has not been accurately determined, but it is a large body. The price to be paid is \$1.65 per ton, delivered at the upper lake docks, with an increase of 3.4 cents per ton each succeeding year. The minimum agreed to be mined is 750,000 tons for the year 1907, and increases by 750,000 tons per year until it reaches 8,250,000 tons, and thereafter it continues on that basis.

The ore, which will be mined by the Steel Corporation, is to be carried over the Great Northern, and as the present rate is 80 cents per ton for this traffic, it is understood that the royalty paid on the ore is 85 cents a ton. This price is for 59 per cent. ore. Other grades are to be paid for on a sliding scale. The following table shows on this average basis the price per ton of ore delivered at the docks, the minimum amount to be mined in each year, and the corresponding minimum payment over the 11 years during which there is a rising amount of ore which the steel corporation agrees to mine. In the years succeeding 1917 the figures given for that year will represent the minimum production:

Year.	Price per ton and freight.	Amount ore, tons.	Payment.
1907.....	\$1.650	750,000	\$1,237,500
1908.....	1.684	1,500,000	2,526,000
1909.....	1.718	2,250,000	3,865,500
1910.....	1.752	3,000,000	5,256,000
1911.....	1.786	3,750,000	6,697,500
1912.....	1.820	4,500,000	8,190,000
1913.....	1.854	5,250,000	9,733,500
1914.....	1.888	6,000,000	11,328,000
1915.....	1.922	6,750,000	12,973,500
1916.....	1.956	7,500,000	14,670,000
1917.....	1.990	8,250,000	16,417,500
Total .....		49,500,000	\$92,895,000

**HUDSON COMPANIES.**—A contract has been let, as noted in our Construction Columns this week, for building a subway from Twelfth street and Sixth avenue, New York City, up Sixth avenue to Thirty-third street, which will be the terminal of the line. Both tubes of the tunnel under the Hudson River have been for some time completed, and work is now under way on the continuation of this tube construction from the river front at Christopher street to Twelfth street and Sixth avenue. The Hudson Companies were incorporated in January, 1905, to merge control of the New York & Jersey, which had begun work on the double-tube tunnel above referred to, and the Hudson & Manhattan, which was incorporated in 1903 to build a pair of tunnels from Exchange place, Jersey City, under the Hudson river to Cortlandt street, New York. Work on these tunnels is about half finished, and the foundations are being built for the Terminal building at Fulton and Church

streets, New York City. This building will be finished some time before the tunnel itself is in operation, but will at once become a source of income through its use as an office building.

**LOUISVILLE & NASHVILLE.**—This company has made an agreement for the purchase of the Chattanooga Southern, which runs from Gadsden, Ala., to a point near Chattanooga, Tenn., about 100 miles of road including branches. It was sold under foreclosure in 1905 to a reorganization committee, which paid \$600,000 for the road. The L. & N. is to pay \$50,000 in cash and \$1,200,000 in 50-year 4 per cent. bonds, being part of a total authorized issue of \$2,000,000, the remainder to be reserved for extensions and improvements.

See Atlanta, Birmingham & Atlantic.

**NEW YORK CENTRAL & HUDSON RIVER.**—The New York State Railroad Commission has given permission to this company to increase its authorized capital stock from \$150,000,000 to \$250,000,000 and to issue \$29,839,560, making the total outstanding \$179,282,060. The vice-president in charge of accounting testified that since the increase of \$35,000,000 was authorized in April, 1902, \$18,000,000 has been spent for improvements, and that the improvements now being made would cost \$51,000,000, and new equipment \$9,000,000. The vice-president in charge of construction said that the electrification of the lines in and near New York City would cost \$70,000,000, and that of the additional stock authorized \$20,000,000 was to be spent on the other proposed improvements.

**NEW YORK CENTRAL LINES.**—Gross earnings of these lines for recent periods are as follows:

	September, 1906.		
New York Central & Hudson River.....	\$8,430,237.01	Inc.	\$323,940.30
Lake Shore & Michigan Southern.....	3,769,845.74	"	285,593.67
Lake Erie & Western .....	465,707.48	Dec.	12,604.29
Chicago, Indiana & Southern.....	201,236.24	Inc.	23,805.35
New York, Chicago & St. Louis.....	812,461.64	"	47,296.06
Michigan Central .....	2,277,213.73	"	121,775.55
Cleve., Cin., Chicago & St. Louis.....	2,227,016.78	"	154,880.93
Peoria & Eastern .....	261,465.46	Dec.	11,701.72
Cincinnati Northern .....	99,019.09	Inc.	16,765.55
Pittsburg & Lake Erie .....	1,197,830.96	"	126,748.59
Rutland .....	273,614.80	"	22,908.28
Quarter Ended Sept. 30.			
New York Central & Hudson River.....	\$24,782,968.08	Inc.	\$1,395,177.21
Lake Shore & Michigan Southern.....	11,177,682.34	"	1,108,429.17
Lake Erie & Western .....	1,408,183.08	"	59,744.00
Chicago, Indiana & Southern.....	337,993.98	"	25,370.25
New York, Chicago & St. Louis.....	2,430,752.45	"	240,883.26
Michigan Central .....	6,571,666.55	"	455,694.37
Cleve., Cin., Chicago & St. Louis.....	6,735,668.20	"	614,353.14
Peoria & Eastern .....	792,285.33	"	47,385.88
Cincinnati Northern .....	302,417.83	"	57,227.36
Pittsburg & Lake Erie .....	3,771,107.73	"	490,413.99
Rutland .....	811,056.66	"	73,756.24
Nine Months to Sept. 30.			
New York Central & Hudson River.....	\$67,662,193.58	Inc.	\$5,084,839.04
Lake Shore & Michigan Southern.....	31,784,778.35	"	3,548,581.66
Lake Erie & Western .....	3,933,562.51	"	295,752.62
Chicago, Indiana & Southern.....	1,684,257.16	"	134,739.90
New York, Chicago & St. Louis.....	7,316,751.99	"	783,972.31
Michigan Central .....	19,190,809.58	"	2,347,677.90
Cleve., Cin., Chicago & St. Louis.....	18,098,187.83	"	1,745,848.40
Peoria & Eastern .....	2,253,842.07	"	202,036.36
Cincinnati Northern .....	778,178.80	"	153,340.19
Pittsburg & Lake Erie .....	10,818,264.70	"	1,484,278.09
Rutland .....	2,078,924.39	"	199,352.58

**NEW YORK, NEW HAVEN & HARTFORD.**—This company has bought the Hartford & New York Transportation Company, which operates a steamboat line from Hartford, Conn., to New York City, its most important interest being coal carrying on barges. It has \$500,000 stock and \$200,000 4½ per cent. bonds.

**PULLMAN COMPANY.**—Edward W. Hanck has been elected chairman of a stockholders' committee, which is trying to get a larger dividend rate and a distribution of part of the present surplus of about \$27,000,000. A committee composed of Henry E. Smith, of New York; A. B. Kellogg, of Buffalo, and E. W. Hanck, is to prepare the plan and go to the annual meeting of the company next November, to present its formal request to the Board of Directors. The board will be asked the purpose for which the surplus is being accumulated.

**ST. LOUIS SOUTHWESTERN.**—The stockholders of the Gray's Point Terminal Railway have authorized a mortgage securing not more than \$4,000,000 first refunding and extension mortgage 5 per cent. 50-year bonds to be guaranteed by the St. Louis Southwestern, which owns all the capital stock of the road, has a 50-year lease on it beginning December 1, 1897, and already guarantees the outstanding \$380,000 first mortgage 5 per cent. bonds. The road runs from Delta, Mo., to Gray's Point, 16 miles. The stockholders have also ratified a supplemental agreement leasing the road to the present lessee for 50 years from August 1, 1906.

**SIOUX CITY, HOMER & SOUTHERN.**—The property of this company has been sold under foreclosure at Dakota City, Neb., to James A. Foye, of Sioux City, for \$16,700. Rails have been laid out of South Sioux City about six and one-half miles, and about ten miles more has been partly built.

